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HUMAN RESOURCES

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LABOR

ECONOMIST ANALYZES USSR JOB PLACEMENT SYSTEM

Moscow EKONOMICHESKIYE NAUKI in Russian No 3, Mar 84 pp 50-60

[Article by A. Kotlyar, professor, doctor of economic sciences, "The Job Placement System in the USSR". The words in slantlines were italicized in original text.]

[Text] The job placement system is ranked by the USSR constitution together with other important socio-economic factors on which the guarantee of the right to work is based. In article 40, which consolidates this right, it is indicated that it "is provided for by the socialist system of economy, the steady growth in productive forces, free vocational education, increased work qualification and the training for new specialties, and the development of systems of vocational orientation and job placement."

The functioning of socialist public production presupposes a systematic distribution of able-bodied members of society according to type of activity and the conjunction of the work force with the means of production on the basis of comradely cooperation and mutual aid of the associated owners of the means of production. In this is comprised the economic content of the distribution of the work force in the system of socialist reproduction.

As with each moment (phase) of social reproduction, the reproduction of the work force in particular, such a distribution permeates all the "stages" of the corresponding socio-economic formation--productive forces, economic basis and superstructure. Thus, socialist distribution of the individual factor of production as a movement of workers to workplaces and the establishment of work cooperation of a different type is a manifestation of the dynamics of/productive forces/. The directly social relations according to the systematic allocation, on a social scale, of workers by type of activity, conditioned by the specific social form of the work force under socialism, constitute/basis relations/. Finally, the organizational forms of the distribution of labor resources which secure a work force for the national economy and, at the same time, join the able-bodied population to social labor constitute the/institutions of superstructure/.

The utilization of superstructural levers in regulating the mobility of the able-bodied population is predetermined by the economic role of the socialist state, for which the organization of a systematic distribution of the work force is the most important area of economic organizational activity. The

fact itself of the implementation by the socialist state of these functions was examined by V.I. Lenin in a number of the most important indications of the communist collectivization of labor. "Labor," he wrote, "is united communistically in Russia to the extent that it, first, has abolished private property in the means of production and, secondly, as far as the proletarian state power organizes, on an overall national scale, large-scale production on state land and in state enterprises, distributes the work force among various sectors of the economy and enterprises, and distributes the massive quantity of consumer products which belong to the state among the workers."¹

The result of the process of distribution of the work force is its inclusion in concrete labor cooperation. The organizational and legal mediation of this is the fact of job placement, fixed by the conclusion of the labor agreement. In other words, every single fact of the distribution of the work force (primary or repeated), every labor shift is completed by job placement, which constitutes the organizational and legal expression of the relations of the distribution of the work force in the sphere of collectivized labor. Labor shifts of various types may represent acts of primary involvement in the public economy, as well as redistributions. These shifts may be implemented in the most varied directions (intra- and inter-regional, intra- and inter-sectoral); they may have as their aim both permanent and temporary work; they may occur individually or by groups, etc. The diversity of aspects of labor shifts and the necessity of a harmonious calculation with regard to their organization of economic interests of various social subjects--individual citizens, production collectives, society as a whole--also predetermined the organizational diversity of implementation of the distributive processes. /The organizational structure through which the distribution and redistribution of labor resources is implemented is the job placement system./ Its economic function comprises the securing of a work force for objects of the national economy and the joining of the able-bodied population to public work.

Not all the links of the job placement system are equivalent. /The organizational form of the distribution of the work force/constitutes its independent structural element. The basic indication of this form is the guarantee of conditioned work to the worker allocated by its help. This indication ensures the realization of an important function in the distribution of the work force--the union of the individual and physical factors of production and the inclusion of the worker in concrete labor cooperation.²

The character and special features of the applied organizational forms of the distribution of the work force depends, to a decisive level, on the level of socio-economic development of society and on the content of various economic and political goals. The organizational forms of the distribution of the work force now applied in our country correspond primarily to the social class structure of a mature socialist society which includes only workers. Production relations, based on public socialist property, presupposes the objective necessity of the universality of labor, i.e. an organization of production under which "no one may shift onto others his share of participation in productive work, this natural condition of human existence."³

Universality of labor and systematic organization of socio-economic development are organically inherent in socialism and ensure full employment for the population. This signifies the objective impossibility of overpopulation in any form and the objective necessity for society to employ all its labor resources. Various factors in the expansion of spheres of labor application act and may be systematically utilized depending upon the level of production development achieved. At the present time, increased employment in physical production is ensured due to the fact that the growth rates in production output are steadily outstripping the rates of increase in labor productivity in all sectors except agriculture. As the economy is transferred onto the rails of intensification, the growth rates of labor productivity will begin to outstrip the rates of increased production volumes, which yields the possibility for reduction of employment in physical production. In such a situation, the growth in quantity of workplaces (to the extent of the need in them for the able-bodied population) will be achieved only by means of accelerated development of the non-productive sphere, as well as a reduction of working time. Thus, the socialist organization of employment guarantees a systematic ensuring of workplaces under any qualitative level of public production.⁴

Being superstructural institutions, the organizational forms of distribution and redistribution of the work force bear the stamp of consistent democratism, characteristic of socialist society. As an element of the job placement system, they ensure the realization of the right of the citizens of the USSR to work under guaranteed freedom of choice of employment in accordance with their vocation, abilities, professional training, education and, taking into consideration the needs of society.⁵ In addition, the job placement system also resolves the task of systematic securing of staff for the public economy, taking into account those changes which occur in the structure of the national economy in connection with the rising course of effectiveness of production and its consistent intensification.

The job placement system in the USSR in its present aspect includes the organizational forms of the distribution of the work force of various jurisdictions. Thus, one form is found under the jurisdiction of the USSR State Committee on Labor and Social Questions and its republic, as well as local, organs: orgnabor, agricultural resettlement, youth job placement (jointly with local soviets), as well as the service of organized job placement represented by corresponding bureaus, which, strictly speaking, is not an independent organizational form of work force distribution. A number of forms enter into the competence of various ministries and departments (personnel allocation of graduates of higher and secondary vocational training institutions; graduates of the system of trade education; transfer of workers from one enterprise to another). Under the jurisdiction of the All-Union Leninist Communist Youth League is found the allocation of youth, who respond to the public call to work in specific, particularly needed objects for the country. Finally, the administration of economic organs independently recruits workers (admittance by the enterprises themselves). In addition, the social security institution is involved with job placement of invalids (according to VTEK [Vrachebno-trudovaya ekspertiza-Medical Commission for Determination of Disability] recommendations), while the organs of internal affairs are concerned with job

placement of individuals who have served sentences in places of detention (according to instructions of the local soviets). The last two methods of job placement, which ensure the guarantee of conditional employment, are independent organizational forms of the distribution of the work force, although their share in the organization of labor shifts is negligible.

Besides the aforementioned independent organizational forms in the country's job placement system, several other channels of allocation function which supplement, as a rule, hiring by the enterprises themselves. As has already been mentioned, this is the service of organized job placement within the jurisdiction of labor organs, the job placement of pensioners, organized by the social security institutions, as well as assistance in the job placement of military personnel who have been transferred to the reserves, rendered by the military commissariats.

The job placement system is not a static or unchanging one. It changes its aspect according to the development of socialist society. V.I. Lenin stressed the importance and complexity of the search for new forms of involving people in public work: "...Constructing new forms of social connections between people, constructing new forms and manners of attracting people to work is the work of many years and decades."⁶

The development of the job placement system occurs in two directions: improvement of the structure of the organizational forms of allocating the work force and improvement of these forms themselves.

The structure of organizational forms/primarily reflects their correlation in the general mass of allocated and re-allocated work force. These correlations are determined by differences in the numbers of those contingents whose allocation according to workplaces is mediated by one or another organizational form. Moreover, if the number of those allocated by single contingents is set in advance, it may fluctuate materially in another manner. Let us say that the number of those who have finished higher and secondary educational institutions, as well as schools in the vocational education system, depends on the plans of output, which quite strictly determines the volume of allocation in the corresponding organizational forms. At the same time, the number of those re-allocated on the basis of transfer, public appeal and other such forms may change materially depending upon the type of requirements in the given conditions with respect to staff and resources of one or another source of the work force.

On the whole, though, the character of the job placement structure is determined by the correlation between forms such as hiring by the enterprises themselves and other organizational forms of allocation. This structure, within the RSFSR, is indicated below.

Structure of organizational forms of work force
allocation in the RSFSR in 1980, by percent

Organized worker recruitment.....	0.7
Agricultural resettlement.....	0.2
Youth job placement.....	2.8
Allocation of trade school graduates.....	9.3
Personnel allocation of graduates of institutions of higher education.....	1.9
Personnel allocation of graduates of secondary vocational education institutions.....	3.0
Transfer.....	3.8
Public conscription.....	0.5
Hiring by enterprises themselves.....	77.8
including job placement channels.....	9.7
Total.....	100.0

As is evident from the data presented, the institutions of the system of the USSR State Committee on Labor and Social Questions control, in any event, no more than 15 percent of labor shifts. The remaining masses of workers are placed in jobs by means of other forms within the jurisdiction of other state and public organizations. Moreover, the dominant role belongs to hiring by the enterprises themselves. Apparently, this is connected with such characteristics of the organizational forms examined as ability for efficient change in the volume of recruitment, depending on the number of vacancies, and the most consistent application of an individual approach to the selection of workers. It is also necessary to take into consideration that hiring by the enterprises themselves gives the possibility to the candidate for the workplace to come into direct contact with the administration of economic organs, which, in many respects, simplifies the implementation of labor shifts. For that reason, it is justifiable to suppose that hiring by the enterprises themselves, in the course of an extended period of time (while the present level of mobility on the part of the able-bodied population is maintained), will be the most significant organizational form of work force allocation. In addition, it is imperative to strive for a material reduction in the place of this form in the system of staff allocation.

In contradistinction to other organizational forms of labor resources allocation, hiring by the enterprises themselves combines within itself both a plan and an extra-plan principle. In the plan procedure, numbers are provided for, and sometimes the professional qualification composition of the contingents subject to hire as well. They may also take into consideration the sources of securing a work force (demobilized individuals from the ranks of the Soviet army; the able-bodied population employed in domestic and individual subsidiary economy; able-bodied pensioners; disengaged workers from other enterprises, etc.). But the direct plan principle of hiring workers by the enterprises themselves ends here. To a significant extent, this form of job placement is based on the planned-uncoordinated shift of workers with regard to the workplace, i.e. on the fluctuation of staff. In overall numbers, the proportion

of individuals employed by the enterprises themselves who have left other organizations comprises 60-80 percent in various oblasts of the RSFSR. In other words, the dominant role of hiring by the enterprises themselves is primarily conditioned by the too high level of fluctuation in the reallocation of manpower in the national economy. The imperative necessity of a decisive struggle to reduce the fluctuation of staff runs through the resolution passed recently by the CC CPSU, the USSR Council of Ministers and the All-Union Central Trade Union Council, "On supplementary measures to strengthen work discipline."⁷

The hiring of workers by the enterprises themselves differs from the majority of the organizational forms of manpower allocation applied under socialism in that, apart from anything else, it is not connected with the preliminary organized formation of a contingent of allocated individuals and with their previous direct inclusion in the production collective. Such contingent formation is implemented by means of various legal forms determined by the special features of one or another variety of organized allocation (conclusion of a contract during orgnabor, registration of a resettlement ticket during resettlement, delivery of authorization during public conscription and job placement of graduates of general education schools, issuing of direction during allocation of specialists, orders and entries in the work-book during transfers).

Another typical characteristic of the majority of organizational forms of manpower allocation is the establishment in normative procedure or by bilateral agreement of the binding force of the arrival of the allocated worker at the previously determined workplace. This ensures the correspondence of the movement of staff for the needs of the national economy and the implementation of the shift within the shortest possible periods. Finally, an important difference (from the standpoint of the content of manpower allocation processes) of the majority of forms of manpower allocation--and it is necessary to stress this circumstance--involves the fact that there exist legal guarantees of hire for the conditioned work (the worker has the legal right to demand hire on the job in the established procedure in case of refusal).

Thanks to the complex of these characteristics, the forms of manpower allocation indicated become an effective means for the systematic formation of combined manpower in socialist society. The first two characteristics mentioned with respect to hire by the enterprises themselves are not typical; the third characteristic is fully typical. This circumstance, as has been indicated, also permits a consideration of hire by the enterprises themselves as a special organizational form of manpower allocation, for this ensures the major function of manpower allocation--union of the individual factor of production with the material ones and inclusion of the worker in concrete labor cooperation.

The environment in which the job placement system functions is labor shifts (more than 25 million occur every year in the country). In the measure in which they unite with the community of directions (according to the points of "exit" and "entry"), these shifts constitute labor flows. The numbers

for a definite time, qualitative composition, level of stability, intensiveness and specific duration belong to the number of indications of labor flow, alongside the organizational form by means of which the shifts are implemented.⁸

The organizational form represents a highly active indication of labor flow in so far as it appears not only as the means of its mediation, but also as a lever of formation. This takes place to the greatest degree when the matter does not involve hiring workers by the enterprises themselves, but consistently planned organizational forms of manpower allocation. In addition, the matter might concern both the organized formation of labor flow at the point of "exit" (for example, the registration of an orgnabor contract for construction with a group of military personnel who must complete urgent work), and the merging in a unified labor flow of representatives of various production collectives (for example, the formation of a detachment of working youth from various enterprises by public conscription for a directive on urgent komsomol construction). Because of the special features mentioned above regarding hire by the enterprises themselves, its organizing role in the formation of labor flows is not great, although this form also mediates a more significant share in labor shifts. In view of these circumstances, the relation to hire by the enterprises themselves should be defined from the standpoint of perspectives for the development of the job placement system. The predominant role of this form, as has been mentioned, will be maintained in the future as well; it is important, however, for there to occur a significant reduction of its specific weight in relation to the growth in the proportion of other organizational forms which ensure a higher level of organization and planning of the processes of the allocation and re-allocation of labor resources. It is justified to expect that the reduction in the share of hiring by the enterprises themselves will occur to the extent of the reduction in the level of mobility and, primarily, of staff fluctuation.

The proportional connection between hire by the enterprises themselves and staff fluctuation was fully confirmed by materials from 26 industrial enterprises in Oryol which we examined in 1976. The grouping of these enterprises dependent on the level of staff fluctuation illustrated that with its growth, the proportion of hire by the enterprises themselves of workers also increases in the overall turnover of staff according to hire (see Table 1).

Table 1

Proportion of hire by the enterprises themselves in the overall volume of hire and the level of staff fluctuation

Enterprise groups	Coefficient of staff fluctuations (K)	Proportion of hire by enterprises themselves	Number of enterprises in group
I	Up to 20.5	80.9	14
II	From 20.5 to 30.5	86.7	8
III	More than 30.5	99.9	4

Obviously, the more similar in character of production the enterprises examined are, the narrower the dependence indicated is. For example, it is hardly necessary to examine construction and industrial enterprises together in one rank inasmuch as the specific production and organizational character of these sectors conditions the essential differences in the regularity of staff movement. Thus, in construction there is a comparatively high proportion of other organizational forms of allocation and a correspondingly lower proportion of hire by the enterprises themselves. At the same time, the special features of working and living conditions among construction workers also conditions, as a rule, an increase of staff fluctuations.

Regarding the tendencies in the dynamics of individual structural elements of the job placement system, the data of Table 2 give a basis for judgment.

Table 2

Dynamics of the organizational forms of manpower allocation
in the RSFSR for 1970-1980 (in percent; 1970 = 100)

	1975	1980
Organized recruitment.....	99.6	98.0
Agricultural resettlement.....	93.3	87.1
Youth job placement.....	83.0	53.1
Allocation of trade school graduates.....	123.6	140.6
Individual allocation of higher educational institution graduates.....	127.8	149.0
Individual allocation of secondary vocational education institution graduates.....	126.5	136.3
Transfer.....	84.2	79.2
Hire by the enterprises themselves (industry).....	91.2	86.2
including job placement service.....	191.3	245.9

It is evident from Table 2 that there is primarily a decrease in volume of labor shifts and systematically organized labor organs (orgnabor, agricultural resettlement, youth job placement). The number of transfers declines--a highly effective form of staff re-allocation. At the same time, the proportion of worker hired by the enterprises themselves also falls, which must be evaluated as a favorable phenomenon which attests to the tendency to reduction in the overall mass of labor shifts.

The absolute and relative growth in the number of those placed in jobs through the mediation of the Bureau of Job Placement for the population (BTN) is an indisputably positive phenomenon which permits a raising of the quality of job placement during hire by the enterprises themselves. The growth in allocation capacities for graduates of higher and secondary vocational education institutions, as well as the trade school system, is, of course, a positive

fact, but it reflects not so much the implementation of the structure of organizational forms of manpower allocation as the dynamics of the scales of the training of qualified staff.

An improvement in the structure of the organizational forms of manpower allocation also presupposes an elimination of shortcomings, caused by the different jurisdiction of forms of job placement and, particularly, their insufficient coordination. The consequence of this is the practice of staff allocation without taking into account their actual need. Thus, in 1981, the "customers" refused 1000 physicists and more than 1100 chemists and 750 biologists trained at universities in the Russian Federation.⁹

One of the most effective forms of manpower re-allocation in the national economy, as has been mentioned, is transfer. As research has indicated, during transfers the duration of interruptions in work is 2.4 times lower and the level of professional interchangeability is 1.4 times lower than during hire of staff by the enterprises themselves. But the objective possibilities of this organizational form are not fully achieved in connection with the fact that more than 90 percent of transfers are implemented without any centralized control. As a result, transfer is utilized not as an effective form of operational securing of staff, but on the contrary, for outflow of workers from important economic objects. Thus, in 1980, as our examinations indicated, the enterprises of many ministries lost more workers than they obtained through transfer. /It is imperative to regulate the organization of transfers./ It would be possible to place the necessary mediation and state control for the practice of transfers in the system of the USSR State Committee on Labor and Social Questions and its local organs.

The lack of coordination in the activity of job placement organs also complicates the involvement of manpower reserves in public production. Thus, in the RSFSR as a whole, every year for various reasons, about 180 thousand people who had been conducting their studies without continuing normal work left secondary general education schools (9-10 classes), trade schools and higher and secondary vocational training institutions. But no calculation of these individuals is made which leads to the fact that, at minimum, no less than 15.5 conventional average annual workers are lost each year.

The second direction of development in the job placement system is the improvement of the organizational forms of manpower allocation themselves. / The most acute problems here are connected with the hiring of workers by the enterprises themselves. The main reason for this is the fact that during recruitment by the enterprises themselves, a mediating organ is lacking in the process of job placement to implement such functions as preliminary selection of contingents of allocated workers and the ensuring of their movement to the conditioned workplaces and in the conditioned periods of time.¹⁰ An important direction in the improvement of this organizational form is the establishment of links which supplement the mechanism of hiring by the enterprises themselves. These links may be calculated in both the job placement of some special contingent (for example, military personnel of the Soviet army who have been transferred to the reserves, pensioners, graduates of secondary schools who

are not continuing their education, etc.) and the mediation in job placement of a broad range of workers (the bureau for job placement of the population). Thanks to such a type of organizational supplement, labor flows beneficial for the national economy are purposefully formed during hiring by the enterprises themselves as well. Thus, in the number of those hired by the enterprises themselves in Oryol in 1976 in the area of industry, 36 percent constituted those who had been sent by BTN and by organs of social security, internal affairs, military registration and enlistment, etc. An especially great role is played by the service of the BTN, whose share in the hiring by the enterprises themselves in cities of the RSFSR with a population of more than 50 thousand people grew from 18.7 to 28.5 percent during 1975-1980.

As far as the other organizational forms are concerned, there are material reserves here too which permit an improvement in the quality and effectiveness of job placement at the expense of an increase in informational, material, technical, organizational and financial security, fuller correspondence of the characteristics and claims of the worker with the parameters of the workplaces, reduction of time and other expenses of allocation, an increase in the national economic efficiency of labor flows, simplification of record-keeping, improvement of planning, etc.

In our view, labor legislation which regulates the movement of staff in the national economy is also in need of changes and additions. Thus, in accordance with the resolution of the Council of Ministers of the USSR of 11 December 1970, "On the procedure for carrying out measures for strengthening the interest of workers in increased production output, the raising of labor productivity and the reduction of employed personnel,"¹¹ the ministries, departments and enterprise managers are obliged to place disengaged workers in jobs. This frequently places the administration in serious difficulties and impedes the disengagement of workers who are awaited in other divisions of the national economy. It seems expedient to free the administration of economic organs from this obligation, which might be transferred to the USSR State Committee on Labor and Social Questions and the Republican State Committees on Labor and their local organs.

In 1960 a procedure was established, in accordance with which if someone was disengaged at his own request, his work service record was maintained if the job interval was no longer than one month. Practice has indicated that at the present time there is a real possibility to place every worker in a job within an average of 13-14 days through the BTN. For that reason, the resolution of the USSR Council of Ministers and the All-Union Central Trade Union Council, "On supplementary measures to strengthen work discipline," has reduced the job interval time, without interruption of work service record, to three weeks.¹²

A study of labor shifts indicates that even individuals disengaged for violations of labor discipline, not to mention those who are disengaged at their own request without valid reasons, often receive a higher salary at their new workplace. According to selective data, the proportion of such individuals reaches 30 percent of the fluctuation volume; moreover, their salary rises an

average of 30 percent as a result of their move. The experience of a number of socialist countries (the Bulgarian People's Republic, the Hungarian People's Republic, the CSSR and others) indicates the high effectiveness of norms of labor legislation set as a barrier to such phenomena.

At the present time, the network of organizations mediating job placement is characterized by departmental disconnection and weak coordination. These functions should be centralized within the system of the USSR State Committee on Labor and Social Questions, while the komsomol organizations, the executive commissions of the local soviets, the institutions of social security, the military registration and enlistment office, etc., should be freed of them. It would be expedient to include representatives of the labor organs also in commissions on allocation of graduates of institutions of higher education, tekhnikums, and trade and technical schools. These measures will assist in raising the role of the labor organs and the bureau for job placement of the population to an efficient utilization of labor resources, more rapid job placement for citizens, strengthening of labor discipline and reduction of staff fluctuation, which are provided for by the resolution of the USSR Council of Ministers and the All-Union Central Trade Union Council, "On supplementary measures for strengthening work discipline."

Great harm results from the irregularity of information on vacancies and increasing fluctuation, which complicates the systematic organization of staff re-allocation. In this connection, it is difficult to overestimate the significance of measures taken by the aforementioned resolution directed at "informing the population of the needs of enterprises, organizations and institutions for blue and white collar workers through the implementation, as a rule, of the bureau for job placement of the population."¹³

Further improvement of the job placement system will permit improvement in manpower allocation in the following directions.

/Minimization of the volume of labor shifts./ Research gives a basis for calculating that no less than 40 percent of the overall mass of labor shifts do not respond to the interests of citizens, labor collectives or society as a whole and are consequently unnecessary and entail unnecessary costs.¹⁴

One proof of this is the widespread practice of people returning to jobs from which they were disengaged. On the average, 12 percent of disengaged personnel in large and small cities of the RSFSR return to their former workplace. The struggle with staff fluctuation is a basic reserve for reducing the volume of inefficient labor shifts.

/Improvement of the direction of labor shifts./ Unfortunately, a certain number of labor shifts are implemented in undesirable directions: for example, from regions with labor shortages to regions with surplus labor, from enterprises without full staff complements to enterprises with numbers of staff over the plan, etc.

Ensuring of correspondence of the references of the shifted workers to the parameters of the workplaces to which they are appointed. It is only with

this sort of correspondence that favorable conditions are established for rapid production adaptation and stabilization of staff, and, consequently, for normal manpower reproduction and high labor productivity. As the examination has shown, the proportion of job placements in which this correspondence is not ensured is still highly significant. Frequently, this is expressed in a groundless change of profession (most often in job placement through hiring by the enterprises themselves). On the average, according to the data of the examination, up to 30 percent of those transferred to a new workplace change their profession, while this figure for those hired by the enterprises themselves is 52 percent. This reduces the effective utilization of staff.

/Minimalization of the duration of intervals between jobs during labor shifts./ Computing for one worker, the average duration of interval is 28-30 days. In 1980, in connection with change of workplace for 25 million people, a material part of combined public working time was lost. It goes without saying that part of these costs was unavoidable, but it also goes without saying that the actual costs exceeded those needed by society.

The level of goal realization achieved by means of separate organizational forms of manpower allocation may be determined on the basis of a comparative analysis of the effectiveness of several elements in the job placement system.

Indices are presented below which may give a representation (direct or indirect) of several of the enumerated parameters of the efficiency of allocation processes:

- Duration of intervals between jobs during labor shifts, which characterizes the drive of various organizational forms of allocation;
- Proportion of individuals who are connecting their future with work at the given enterprise; this index characterizes the potential fluctuation of corresponding contingents and, by this, the perspectives for consolidation of staff allocated by means of one or another organizational form;
- Proportion of those changing profession on entering work (taken on as apprentices), which characterizes the level of correspondence of qualitative parameters of workers allocated by means of various organizational forms and of analogous parameters of the workplaces to which they are appointed.

An evaluation of these data may be given by the results of the examination conducted in Oryol (see Table 3).

Таблица 3

Некоторые сравнительные характеристики процессов распределения рабочей силы
посредством различных организационных форм*

2	3	4	5	6	7	8	9	10
Организационные формы	Продолжительность перерыва в занятиях до поступления на работу, дни	Ранг	Доля лиц, связывающих будущее с работой на данном предприятии, среди распределенных посредством этой организационной формы, %	Ранг	Доля сменяющих профессию при поступлении на данное предприятие среди распределенных посредством этой организационной формы, %	Ранг	Доля принятых учениками среди рабочих, распределенных посредством данной организационной формы, %	Ранг
Перевод . 11.	11,3	3	56,8	1	36,3	5	1,7	2
Распределение окончивших ПТУ, ТУ** 12	1	1	41,8	4	10,8	1	1,9	3
Персональное распределение молодых специалистов (выпускники вузов и средних специальных учебных заведений)	1	1	30,2	7	15,1	2	1,6	1
Трудоустройство молодежи 14	29,1	5	45,0	3	31,3	4	27,9	7
Прием самими предприятиями 15	26,9***	4	56,5	2	52,1	7	12,1	6
Общественный призыв 16	37,3	6	32,9	6	47,8	6	11,4	5
Организованный набор 17	70,2	7	37,5	5	21,9	3	3,6	4

16 * По данным обследования 26 промышленных предприятий, проведенного в 1976 г. в г. Орле.

** При распределении выпускников высших, профессионально-технических и средних специальных учебных заведений

19 * За вычетом продолжительности очередных отпусков, используемых частью граждан после увольнения с последнего места работы

Table 3

KEY:

1. Some comparative characteristics of manpower allocation processes by means of various organizational forms
2. Organizational form
3. Duration of employment intervals until beginning work, in days
4. Rank
5. Proportion of individuals who connect their future with work at the given enterprise, among those allocated by means of this organizational form, in percent
6. Rank
7. Proportion of those changing profession upon entering the given enterprise, among those allocated by means of this organizational form, in percent
8. Rank
9. Proportion of those taken on as apprentices among workers allocated by means of the given organizational form, in percent
10. Rank
11. Transfer
12. Allocation of trade and technical school graduates
13. Personal allocation of young specialists (graduates of higher education institutions and secondary vocational training institutions)

[Key continued]

14. Youth job placement
15. Hire by the enterprises themselves
16. Public conscription
17. Organized recruitment
18. *According to the data of an examination of 26 enterprises conducted in Oryol.
19. During allocation of graduates of higher education, trade and secondary vocational training institutions, the duration of intervals depends basically on the length of vacation after completion of education.
20. Allowing for the duration of regular vacations utilized by some citizens after disengagement from their last workplace.

Many of the characteristics presented in Table 3 are conditioned by the special features of the organizational forms. Thus, duration of intervals between jobs is greatest under public conscription and organized recruitment, i.e. in forms which primarily implement inter-regional re-allocation of manpower connected with relocation. The high proportion of those taken on as apprentices among graduates of secondary schools placed in jobs is explained by the fact that the given organizational form mediates shifts or groups of labor resources which are in a situation of professional self-determination. The low rate of change of profession among young specialists, as well as graduates of trade schools is a consequence of the active procedure of directing them to work in accordance with their acquired specialty and qualifications.

In addition, a number of characteristics shown in Table 3 reflect present shortcomings in the organization of manpower allocation:

- Long intervals between jobs among citizens hired by the enterprises themselves, although the shifts represent primarily those of an intra-republican character here;
- High rate of change of profession in public conscription and hire by the enterprises themselves;
- Significant potential fluctuation of staff allocated in practically all the organizational forms; transfers and hire of workers by the enterprises themselves constitute some exceptions, but here too the situation should not be considered favorable, for 43-44 percent of citizens placed in jobs in this way are not orientated into the work perspective at the given enterprise, a fact which harbors within itself the basis of the origin of new labor shifts. It is especially necessary to treat broad orientation at the work place carefully in the case of young specialists and graduates of trade schools, individuals arriving by public conscription or organized recruitment, as well as graduates of secondary general education schools.

The arrangement in order of size of characteristics of manpower allocation in various organizational forms in order to obtain a generalized integral index of their efficiency¹⁵ and a summary of the range characteristics and a consequent calculation of average ranges according to each form indicated the following:

Organizational Form of Manpower Allocation	Average rank
Allocation of trade and technical school graduates.....	2.25
Transfer.....	2.75
Personal allocation of young specialists.....	2.75
Youth job placement.....	4.75
Organized recruitment.....	4.75
Hire by the enterprises themselves.....	4.75
Public conscription.....	5.75

Of course, the results of such a comparison are, to a significant degree, relative; nevertheless, they permit definite conclusions to be drawn. Man-power allocation is implemented most efficiently in the form of transfers, as well as by the allocation of graduates of higher and secondary vocational education institutions and trade schools. But even these, not to mention all the other organizational forms, require material improvement in order to raise the level of efficiency in the processes of allocation and re-allocation of labor resources.

FOOTNOTES

1. Lenin, V.I., Complete Works, Vol 39, p 273 (our italics, A.K.).
2. Without possession of this indication, it is not possible to take into account the independent organizational form of such a massive channel of allocation and re-allocation of manpower as the city bureaus for the job placement of the population (on this subject, see Kotlyar, A.E. & Trubin, V.V. "Problems of regulating manpower re-allocation," Moscow, 1978, pp 26-28). This also relates to several other channels of manpower allocation (job placement of pensioners; that of military personnel of the Soviet army who have been transferred to the reserves, if the question is not one of return to the workplace, concerns employment until call-up).
3. Marx, K. & Engels, F., Works, 2nd ed, Vol 20, p 305.
4. The socialist system of employment does not recognize antagonistic contradictions (their glaring manifestation under capitalism is unemployment). But it does not eliminate the possibility of non-antagonistic contradictions (revealed, for example, in a shortage of workers).

5. See the USSR Constitution (Fundamental Law). Moscow, 1977, p 40.
6. Lenin, V.I., Complete Works, Vol 40, p 316.
7. See "Pravda", 1983, 7 August.
8. Regarding this, see: "Manpower movement in a large city. Problems of regulation" ed. by A.E. Kotlyar. Moscow, 1982, pp 20-23.
9. See "With a specialist's diploma." "Pravda," 1981, 12 July.
10. At the present time, these functions are fulfilled by various state and, sometimes, public departments. Thus, with respect to organizational recruitment, resettlement and, to a certain extent, transfers of qualified workers, these functions are implemented by labor organs; allocation of graduates of vocational institutions is implemented by the corresponding central department; job placement of graduates of general education schools is implemented by the commissions on youth job placement of the local soviets; public conscription is implemented by the corresponding public organizations.
11. See "Collection of Decrees of the USSR," 1971, No 1, p 2.
12. See "Pravda," 1983, 7 August.
13. "Pravda," 1983, 7 August.
14. Regarding this, see "Manpower movement in a large city," pp 119-122.
15. According to the indicators of duration of intervals, change of profession and proportion of those taken on as apprentices, the organizational forms are ranged in the order of their increment, i.e., for example, the minimum rank (1) is conferred on that form where there is the lowest duration of interval between jobs (transfer) and the maximum (7), on the form with the highest duration (organized recruitment). According to the interval of potential fluctuation, the range is implemented in reverse sequence: the minimum rank (1) is conferred on the form which ensures the least likelihood of disengagement of workers from an enterprise (transfer, in our example) and the maximum (7), on the form for which the maximum likelihood of disengagement is characteristic (personal allocation).

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LABOR

SEMINAR FEATURES NEW APPROACHES TO WORK SCHEDULES

Moscow SOTSIALISTICHESKIY TRUD in Russian No 6, Jun 84 pp 68-77

[Article by A. Kurskiy, G. Telaveli and G. Udovichenko: "New Forms of Organization of Work Time (From Materials of the Scientific-Technical Seminar)"]

[Text] To ensure the best conditions for highly productive labor by each worker and the most effective application of work time and labor resources, and to increase the level of social satisfaction with labor -- these important tasks in improving the Soviet economy were defined by the 26th Party Congress and subsequent Plenums of the CPSU Central Committee. The program for social development and improved living standard of the people adopted by the congress particularly stressed the need to create favorable conditions for expanding the participation of women, pensioners and other presently unemployed groups of the population in social labor. This step is quite significant in connection with the definite shortage of labor resources. The improvement of existing labor regimens and forms of work time organization and the introduction of new ones will play an important role in the successful resolution of the above-mentioned problems. Specifically, regimens of flexible and part-time working hours are attracting ever greater attention. The Basic Directions for Economic and Social Development of the USSR for the Years 1981-1985 and to the Period to 1990 adopted by the 26th CPSU Congress state that: "Women with young children should be given the opportunity to work a partial day or partial work week according to a sliding scale, as well as to perform work in the home."¹

The USSR State Committee on Labor and Social Problems, in conjunction with the VTsSPS [All-Union Central Council of Professional Unions] Secretariat have already adopted and enacted a number of normative statutes regulating the specific conditions for introduction of certain labor regimens, as for example the Statute on the Order and Conditions of Application of Labor by Women Having Children and Working Part-Time and the Statute on Labor Conditions for Home Workers. According to the plan for scientific research ratified by the USSR State Committee on Labor and Social Problems, the All-Union Scientific-Methodological Center for Labor Organization and Production Management is dealing with this problem for the purpose of developing methodological materials.

¹ Materialy XXVI s"yezda KPSS, [Materials of the 26th CPSU Congress], Moscow: Politizdat, 1981, p 178.

The practical experience of a number of enterprises and organizations in various sectors of the national economy studied in the course of this research testifies to the unquestionable effectiveness of new forms of work time organization. At the same time, it shows that there are real possibilities for using part-time work regimen, home labor and flexible schedules not only for women with children, but also for a wide contingent of workers. The June (1983) Plenum of the CPSU Central Committee noted the need for ensuring the integration of the economic and social policies. We believe that the introduction of flexible and part-time work schedules and home labor wherever this is possible and expedient represents a specific example of the implementation of such a policy, which effectively combines the economic interests of the state with the social needs of the workers.

A seminar recently held by the All-Union Scientific-Methodological Center for Labor Organization and Production Management in conjunction with the Moscow House of Scientific-Technical Propaganda imeni F. E. Dzerzhinskiy and with participation by the Labor Administration of the Moscow City Soviet ispolkom was devoted to current questions of methodology, practical experience and effectiveness of application of new forms of work time organization facilitating better application of labor resources at industrial enterprises and institutions. There were 260 representatives of 116 enterprises and institutions, a number of ministries and departments, VUZes and NOT [scientific organization of labor] centers present at this seminar.

ESSENCE OF NEW REGIMENS AND THEIR SIGNIFICANCE

The speech presented by Section Chief of the All-Union Scientific-Methodological Center on Labor Organization and Production Management M. Begidzhanov and Candidate of Economic Sciences A. Frolov was devoted to this topic. It told of the accumulated experience in the application of flexible work schedules and presented the methodological basics for their development, experimental testing and introduction.

In our country, flexible work schedules were first used in 1972 at the Shale-Chemical Production Association imeni V. I. Lenin in the city of Kokhtla-Yarve in the Estonian SSR. Here they were first tested in the bookkeeping section, and then in several other subdivisions, including production. By 1980 they were already being used at 13 industrial enterprises in the republic. This work is also being performed on a large scale at the enterprises and organizations of Novosibirsk.

Studies have shown that according to partial data, flexible work schedules have been introduced on the whole throughout the country at 80 industrial enterprises and in the scientific-research and project design organizations of various ministries and departments. Extensive experience in their application, including directly for operating industrial enterprises, has been gained abroad, where different variants of flexible work schedules are used rather widely and give good results.

The peculiarity of such a system of work time organization consists of the fact that the person is no longer tied to the general times for starting and

finishing work strictly established for everyone. Rather, he himself has the right, within certain limits, to regulate his work day and to plan his daily work load, keeping in mind the main condition of maintaining the interests of production. With a flexible work schedule, each worker is given a mandatory time when he must be present at his work station, as well as a flexible time (as a rule, this is at the start or end of the work day). Within the limits of the flexible range, he himself determines the specific time at which he starts or finishes work, as well as the overall duration of work time on a given day. Shortages or excess hours worked as compared with the established work day duration are usually compensated (made up or not made up) during the following work days of this week, or even month.

Of course, this schedule is to a large degree based on trust and honesty, and it is specifically for this reason that it requires primarily the most responsible attitude toward labor and production discipline. This is why not every collective and not every worker is worthy of the right to be transferred to a flexible work schedule. This means that it is necessary to skillfully combine educational work with strict control over adherence to the established schedule. The role of the labor collectives is important here. Based on self-regulation, they can at the present time act upon inefficient workers in a much more effective manner than any administrative measures.

The speech noted that there is no truth at all to the affirmations which we sometimes hear regarding the fact that flexible schedules do not facilitate strengthening of labor discipline, and even lead to its total dissolution. First of all, the very concept of "flexible" does not mean that this is an "arbitrary" schedule in the sense of "I will work whenever I want to." These schedules too are regimented by their structure, and must be strictly maintained. Secondly, from the standpoint of application of work time, as evidenced by numerous examples presented at the seminar, by their end results they have the advantage not of ensuring the formal adherence to punch-in and punch-out times, but rather of a more complete utilization of the entire work time fund.

Contradictory opinions may also be encountered in a number of publications in the periodical literature. These state that it is necessary to immediately introduce flexible work schedules everywhere. These affirmations are also unfounded and do not help the matter. An analysis of the accumulated experience, the research of specialists and the remarks of the seminar participants all testify to the presence of a number of limitations. These may be of a technological character, associated with the peculiarities of the production, as well as organizational. Thus, in production subsections the main limiting factors are the continuity of technological processes, work on conveyers with forced rhythm, etc.

We must stress in particular that in all cases the introduction of a flexible schedule requires precise organization of accounting and control over the application of work time, as well as a well developed standardization of labor of absolutely all personnel categories, with no exceptions, on the basis of sectorial, intersectorial and other more progressive standards. The transfer of engineering-technical workers to flexible work schedules requires

the presence of substantiated work volumes and standardized assignments which may be used to determine on a regular basis what they have actually fulfilled over a specific time interval.

The underestimation of the above-mentioned limiting factors in efforts to introduce flexible work schedules cannot give positive results, and invariably leads to a deterioration of the technical-economic indicators of the enterprise and organization's activity. This means that their introduction must be preceded in each individual subsection by a preliminary experimental determination of their applicability under the given conditions. Only then, under favorable indicators, can the transfer to the new schedule be implemented. Widespread propaganda on the essence and effectiveness of flexible work schedules is also needed.

The major portion of M. Begidzhanov's and A. Frolov's speech was devoted to the advantages of flexible work schedules. The greatest significance of flexible schedules is that they make it possible to more economically and effectively utilize the overall work time fund by significantly reducing work time losses due to administration-approved absences, intra-shift and full-day idle times, absences, tardiness, etc. While under strictly regulated working conditions the hours during which a worker is absent with administration approval are, as a rule, lost without recompense, under the flexible schedule all the extra-work matters are taken outside the limits of the work time and, in any case, such time expenditures must be fully compensated. Otherwise, the wages of those who have not fully worked the time norm set by the law are reduced accordingly. This means that the state no longer bears unjustified losses. The fact that losses for this reason are very high has been noted in our press and in oral presentations.

Furthermore, with such labor conditions people do not fear transport tie-ups. They select a less crowded period for going to work, and therefore arrive there calm, in a good mood, and without the threat of having an unpleasant discussion on this matter with the personnel department or with their direct supervisor. A good mood ensures better involvement in work and high labor effectiveness throughout the course of the entire work day.

Another important aspect is also the fact that under conditions of a flexible work schedule one may select the most convenient time take the children to nursery school, send them off to school, stop in at the domestic services institution, polyclinic, etc. on the way to work. And all this is done without any detriment to the work, and not on work time. Such a schedule is convenient for those studying in evening or correspondence educational institutions.

Finally, flexible schedules present a great advantage in that they create an incentive to go to work in certain categories of people who are presently not engaged in the national economy, primarily pensioners and women with children. This factor is rather significant under the conditions of the personnel shortage currently being experienced at numerous enterprises.

According to the data of the investigation conducted by the USSR State Committee on Labor and Social Problems, the application of flexible work schedules at industrial enterprises and organizations of a number of ministries, it was noted, was responsible for increasing the overall number of hours worked. This was due to a reduction in the direct losses of work time, absences, intra-shift and all-day idle times, administration-excused absences, as well as temporary inability to work, particularly in connection with caring for a sick family member, etc. All enterprises and organizations utilizing such schedules showed a sharp reduction in overtime, and the losses in work time for all reasons were much lower than the average sectorial figure. The introduction of flexible schedules made it possible to almost fully eliminate tardiness and absences on work time for personal business with excuse of the administration.

At Dneprogiproshakht, where the flexible schedule was introduced only in 1979, the losses in work time due to unexcused absences dropped from 8-10 days per year for each worker to 0.8 days, which is only 1/10 to 1/12 the figure for other similar organizations. It is true that this was facilitated by an entire series of measures. However, the transition to a flexible work schedule played a decisive role in them. And here is an indicative fact: out of 600 questionnaires which were filled out anonymously, only one said that the flexible schedule gives no advantages.

NEW REGIMENS EARN THEIR PLACE

K. Demidov, V. Goryachev and I. Mitryashina, workers of the Moscow Soviet ispolkom Administration on Labor, told of the practical experience and effectiveness of the application of flexible work schedules at industrial enterprises and organizations in the nation's capital. According to their report, in Moscow such schedules have been introduced in the subdivisions of 10 enterprises and organizations, with 74.2 percent of the workers changed over to them being women. In accordance with the resolution adopted in October of last year by the Moscow City ispolkom Administration on Labor, the decision was made to continue the introduction and expand the practice of utilizing flexible work schedules in the capital's enterprises and organizations with consideration for the peculiarities of production, the level of readiness, and the productive expediency.

The practical experience and various social and psychophysiological aspects of the application of flexible schedules in production subsections were illuminated in the speech presented by the Director of the Kaluga Radio Tube Plant imeni 50-letiya SSSR

R. Zaynetdinov and Senior Sociologist N. Tsybul'ko. Women comprise 75 percent of those working at this enterprise. Most of them have children of preschool and school age. The possibility of planning their own work day presented on the basis of flexible work schedules and within the limits set by the plant's situation made it possible for them to improve their working and living conditions. The effectiveness of work time application has increased, and as a result, so has labor productivity. The workers may now spend more time on self-education, sports, theatres and cinema. However, the most important thing is that favorable conditions have been created for bringing up their children and keeping house.

The installation section of one of the assembly shops having stable technical-economic indicators and good labor and production discipline was selected as the initial facility for the experimental introduction of the flexible schedule. The practice of its operation showed that the installers, reducing their work day by 1-1.5 hours when necessary and making this time up on other days of the week, always successfully fulfilled and even overfulfilled their weekly production assignments. This, after all, is the chief result, and it is this which has made it possible to change over to the introduction of flexible schedules in other subsections of the plant.

The following examples for this enterprise are evidence of the effect of the new form of labor time organization on the growth of labor productivity. According to the data of one survey, 34 percent of those questioned explain the growth in labor productivity by the fact that there is less fatigue, and 68.5 percent -- by the more rational utilization of work time. In shop No 3 in foreman L. Rozhkova's section, a group of installers exceeded the fulfillment of the output norm by an average of 13.6 percent over a 2-year period, and individual workers exceeded the norm by 17.2 percent. In the same shop the number of days lost due to administration-approved absences comprised only 10/33 the number 5 years ago. The satisfaction with the work and improved mutual relations in the collective also had an effect on personnel turnover. In 6 years it was reduced by 5.9 percent among the shop workers.

The sectorial scientific-research institute performed a series of psychophysiological studies at the plant. These studies, which considered the peculiarities of the labor activity, included a study of the visual analyzer, the cardiovascular and the nervous systems. It was determined that fatigue of the nervous system sets in only by the end of the second half of the work shift, while prior to the introduction of the flexible work schedule it was already manifested before the lunch break.

The experience in operation according to a flexible schedule also pointed up certain difficulties. In the opinion of R. Zaynetdinov and N. Tsybul'ko, these are caused by absence of intersectorial methodological recommendations on flexible work schedules, of a unified system of tabular accounting, and of normative documents for accounting of time worked. They expressed the hope that the work of promulgating the new labor schedules will be based not only on the enthusiasm of individual people and regulations of internal labor order within the enterprise, but should also be quite clearly reflected in labor legislation.

In his interesting presentation, Chief Engineer of the "Eksiton" Plant NOT Section (city of Pavlovskiy Posad) S. Orlov told of the practice of using flexible work schedules in integrated open brigades of installers. This step was preceded by extensive preparations: leading domestic and foreign experience was studied, statutes on the experimental introduction of flexible work schedules were developed, timesheet accounting blanks and inserts into work passes were developed, a time clock was purchased to mark the starting and quitting time. Extensive explanatory work was also needed, since some of the workers did not believe in the success of the matter. There were also those who were clearly opposed to flexible schedules, particularly among the foremen (by the way, many of them have now become avid proponents).

Flexible work schedules were initially introduced at two production sectors employing mostly women. They were joined into 11 brigades, 9 integrated and 2 specialized. As a result of the transition to the new schedule, in one of the sectors the annual growth in labor productivity increased by a factor of 1.6, while in the other it immediately increased by 10 percent, and the level of first-order product delivery increased significantly. According to the computations of plant specialists, the reductions in unexcused absences, legally excused absences and losses due temporary disability made it possible to produce an additional product output of 9,000 rubles per year in both the sectors. Effective May 1983, an additional 837 women were transferred over to flexible schedules, and almost all of them were members of work brigades.

The experience of this enterprise, as well as that of the Kaluga Radio Tube Plant, is interesting primarily because it proves the great possibilities of introducing flexible work schedules under conditions of brigade organization of labor. Hundreds of people are on flexible schedules at the "Eksiton" Plant, and this is evidence of the fact that this system is being generally accepted here.

In his speech, S. Orlov also touched upon certain technological, organizational, economic and social aspects of the application of flexible work schedules under brigade methods of labor. He gave specific examples of their compilation with consideration for the requirements set by technology and organization of production, including double-shift operation. He also presented a number of proposals on how to determine the economic effectiveness of such schedules. In his opinion, the presently practiced method of payment in the brigades according to the end result and in relation to the qualifications and time worked with the aid of the KTU* is the best way of facilitating rigid control on the part of the entire collective over the full work load of each of its members during the entire shift.

V. Zhil'tsov, V. Preobrazhenskiy and A. Kobzar' devoted their speech to the problem of individual planning of the activity of scientific-research institute workers transferred to flexible work schedules. As practical experience has shown, employees working at scientific-research institutes where flexible work schedules have been introduced may, within established limits, set their own work hours in the course of the day or week, and part of their work time may not correspond with the presence of their direct supervisors. In order to change over to such a schedule, it is necessary to increase the role of individual planning, to establish a direct dependence between the results of the labor and the amounts of material incentive, and to think through and introduce a precise system of accounting for the time actually worked and its application in the course of each work day.

Special statutes have been created at certain scientific-research institutes to evaluate the quality of work performed for the month and the quarter. These define the order of computation of the corresponding coefficients. The amounts of quarterly premiums paid to the workers are determined in accordance with the results of their labor, expressed through quality coefficients.

Along with the individual monthly plans, self-evaluation logs for each work day have been introduced in a number of subsections. The format of the log

*Coefficient of labor participation

consists of five vertical columns, one for each work day of the week. Each of these is divided into segments corresponding to hours of work time. When starting work, the worker must mark his starting time on the time scale, briefly enter the work description, and upon completion of the task again mark the time scale. This makes it possible to easily control the actual work load of each worker in the course of the day, as well as the effectiveness of his application of work time. As a result, the activity of the workers has noticeably increased. It has become the norm for a worker, having finished an individual assignment ahead of time, to receive an additional one. Obviously, such an order of things is expressed in the amount of the quarterly premium.

As practical experience has shown, wherever flexible work schedules are used along with certain progressive standards of labor expenditure by designers and planners and there is at the same time a reduction in the number of approvals needed for certain types of documentation, etc., the average duration of scientific-research and experimental design work has been reduced from 2-2.5 to 1.5 years during this period, while the average duration of the cycle "research--development--production" has been reduced from 3.8 to 3.4 years. This, obviously, has given a very great economic effect. In the opinion of the speakers, self-evaluations of the work day make it possible to obtain data on the labor consumption of certain routine work and to compute it on the basis of average standards. This, in turn, serves to increase the substantiation for planning the employee work load.

Numerous speeches presented the question of the methods and means of accounting and control over the utilization of work time. Thus, the speech presented by A. Svistunov on an automated system of accounting for work time (ASURV) was perceived with great interest. As he noted, the necessity of creating such a system is dictated by the fact that traditional tabular accounting requires considerable expenditures of manual labor and a large volume of paperwork. It is associated with a certain degree of subjectivism and is inefficient. Therefore, it has become an inhibiting factor in increasing the effectiveness of work time utilization. In turn, the ASURV makes it possible at any given moment to obtain information on the time when any worker or group of workers arrive (leave) and on their presence at the enterprise, as well as to perform statistical processing on any parameter stored in the system's memory.

The speaker clarified the order of processing documents on tabular accounting using the example of one work day. In the course of information processing, the system sorts the information by subsections, compares it with a reference table of work schedules, determines any deviations, and transmits the obtained data to print-out form. Persons who have disrupted the schedule or not appeared for work are identified by subsection. Then the print-out is forwarded to the appropriate supervisors. At the subsections, the reason for tardiness or absence is written in on the form, and the names of those who disrupted the schedule with the consent of the management are added. At the end of the day the print-out is returned to the central office. Here the collected information is input into the system, and after departure of the workers, information on unsanctioned schedule disruptions is printed. The following day, the subsections are informed of such infractions for the preceding day, and given the current morning's information. The summary data on sanctioned and unsanctioned work time losses by subsections are forwarded for analysis to the enterprise management.

As a result of the introduction of ASURV and its operation, significant economic effect has been achieved and many people engaged in tabular accounting have been freed for other duties. The speaker stressed that this system may be adapted to conditions of an enterprise with any number of workers, any working conditions or schedules.

The Director of the Lipetsk Machine Tool Building Plant V. Nisenman also devoted a considerable part of his presentation to accounting and control over the utilization of work time and the state of labor discipline. A system of automated tabular accounting based on "Kolkhida-2" instruments and the "Nairi-3-1" electronic computer is in effect here. The selection of the technical means was not very successful here, but at the time that the automated system was being developed at this plant the "Kolkhida-2" installation was being produced by the industry. This made it possible to introduce individual schedules for every worker for whom this was substantiated. Many factors had to be taken into account here, since the application of a flexible work schedule requires a change in the outlook on organization of production. Also, the analysis of labor losses is oriented toward the search for new organizational forms. After all, someone must fill in for a worker who is absent from his work station, and the professions of the workers may not always coincide.

Only brigade methods of labor organization could give a solution to this problem. The brigades themselves began proposing changing the work schedule based on the interests of production and of the collective's members. Now, having selected a suitable schedule and coordinated it with his comrades, the shop management and the professional union organization, the worker forwards his request to the automated apparatus control center. The schedule is introduced into the computer memory, and henceforth the computer controls its implementation. At night the computer analyzes all the information from both shifts on the disruption of the daily schedule for the subsection or of the flexible schedule for a specific worker. At the start of the work day, the results of the analysis are forwarded to the subsection in the form of a report on the deviations from the daily work routine. This report individually specifies the persons who did not report for work for unknown reasons or for reasons confirmed by excuse documents. Those who did report for work but who disrupted the work routine in the course of the day are placed on a special list with a return tear-off section. The subsection supervisor, investigating each specific case, enters the code for the reason explaining the disruption in the work routine. This code is later entered into a table which is used to analyze these reasons.

Thus, tabular accounting becomes more complicated. However, the computer helps to overcome these difficulties. With the introduction of computers at the plant, five accountant positions have been eliminated. In the opinion of V. Nisenman, a unified system of tabular accounting is needed, similar to those which regulate the processing of design and technological documentation. He also believes that the work disability forms and reports of household accidents issued by the medical institutions should be adapted to requirements of mechanized accounting. The same is true also for such documents as donor certificates, reports by police and people's courts, assessor's reports, reports on the fulfillment of deputy and other public duties, etc.

The last of the series of speeches devoted to flexible work schedules was the presentation by A. Frolov, who told of experience in their application abroad. This speech presented interesting information on the use of flexible schedules directly in the production subsections of a number of industrial companies, including in flow-line production and during shift work, as well as information on the adaptation of the production organizational structure, the system of management and control, and the technology to the peculiarities of flexible schedules. For example, under conditions of a series of production lines in the Telefunken Company, the introduction of flexible work schedules was facilitated by the transition from detail assembly to consolidated (unit) assembly. The part of the speech which told of the methods and means of accounting and control over the utilization of work time and of the rapid development of an entire sector specializing in the output of such means was also quite useful. Several years ago at a special exhibition held in Paris, over 30 companies exhibited various types of equipment adapted to conditions of application of flexible work schedules.

PARTIAL WORK DAY, PARTIAL WORK WEEK, HOME LABOR, WORK SHIFT METHOD

Several other forms of work time organization were also examined at the seminar. One of them was the partial work day or partial work week. Let us remind the reader what these are. In accordance with our labor legislation, certain categories of workers may, upon agreement of both parties (the worker and the administration) be given permanent daily or weekly work below the generally established norms. Their labor is compensated proportionately to the time worked in accordance with the output. Another form of work is home labor. It is organized under household conditions, with the materials, tools and means of labor being allocated by the enterprise or purchased at its expense. There may also be another variant: the product is made from the worker's own materials, with the use of personal mechanisms and instruments. Members of the worker's family may also participate in fulfillment of the home labor assignments. The payment is made in accordance with the volume of work completed.

Experience has shown that for certain categories of the population (working and non-working women with children, housewives, working and non-working pensioners and invalids of labor and the Patriotic War), the partial work day or the partial work week are more convenient and attractive than the usual rigidly regulated schedules of a full work day. Also, for students of VUZes and those studying at technical schools, vocational schools, and general education institutions, the part-time work day gives the only possibility of devoting part of one's free time to participation in socially beneficial labor and as a result improving one's financial position. In a number of cases, work performed in the home is more convenient for some of the above-mentioned categories of the population.

Thus, the examined forms of work time organization correspond to public interests as well as to the personal interests of a large contingent of citizens. There are broad possibilities for the introduction of part-time work at the enterprises of the food, light, textile and sewing industries, for which a short cycle of operations is characteristic, as well as at enterprises with seasonal, intra-week and intra-day fluctuation in the need for a work force and in

non-production sectors. Home labor also has its spheres of application. However, statistical data and survey materials show that although the practice of utilizing these schedules is increasing in our country, it is still very slow and on a clearly insufficient scale. There are several reasons for this.

One of them is the rather low degree of information which enterprise managers, engineering-technical workers, and the citizens themselves have regarding the nature of these new work schedules, their advantages, possibilities, and conditions for introduction. The absence of the necessary methodological recommendations is also indicative, particularly in regard to the partial work day. Therefore, the speech presented by G. Mil', candidate in economic sciences and senior scientific worker of the Central Scientific Research Laboratory on Labor Resources (TsNILTR) of the RSFSR Goskomtrud [State Committee on Labor and Social Problems] was met with great interest. It was devoted to the essence and effectiveness of part-time work schedules and to the peculiarities of their application in the sphere of services. It is specifically within this sector that two-thirds of all those transferred to the partial work day are presently employed, but even here their relative share comprises only one percent of all the workers in the sector.

The speaker stressed that the participation of persons working a partial day (week) in social production is most often determined by motives of a material as well as a moral nature. However, the relation of the former and the latter varies significantly depending on the age of the person, his family status, level of income, etc. Thus, 65 percent of the women of working age questioned specified reasons of a material nature (receiving additional income and obtaining work credit towards a pension in the future). Of the old-age pensioners working in the sphere of services, over 54 percent gave the same reasons, and of day students at VUZes — 75 percent. A survey conducted by TsNILTR at domestic service enterprises showed that among those who are working part-time, around four-fifths are laborers and over one-tenth are engineering-technical workers.

The speech told of the selective study of the economic effectiveness of using this form of work time organization at domestic service enterprises in the capital city. The work schedules of tailors working under part-time and full-time conditions in four tailoring shops were studied. It turned out that the former had an average time norm fulfillment which was 20.5 percent higher, and an average hourly output which was 14.5 percent higher than for those working under a standard schedule.

As the laboratory studies showed, part-time work for a number of categories facilitates better utilization of the work time fund. Thus, for piece-workers of working age transferred to a partial work day, full-day losses of work time (including for reasons of illness and administration-excused absences) were only one-half, while the intra-shift work time losses were only 10/37 of the previous amount. This is explained primarily by the lower fatigue of the organism, as well as by the desire to work more productively, without losses, in order to earn more and at the same time to make more time for the family and for raising children.

The speech presented by General Director of the Mostekstil'prom Production Association V. Galkin told of the experience of using home labor. In the association, out of 5,000 workers, over 3,000 are home laborers. Among them are pensioners, invalids and women with children. As the speaker noted, in hiring women who are mothers for home labor, we are solving an important economic problem along with a social one. We are increasing the nomenclature and output of consumer goods and improving their quality. Another important fact is that the products manufactured by home laborers are profitable. The average profitability comprises 16.4 percent of the production cost, while the retail price is no higher than for similar products made in shops. Although the wage expenditures per unit of production are somewhat higher for home workers as compared with the shop worker, this is compensated by the fact that the enterprise does not have to expend means for the operation of production buildings, structures, or electrical energy. Also, there are fewer expenditures for equipment. The overhead expenditures for production manufactured in shops comprise 180 percent, and for home laborers -- only 50 percent. In the opinion of the speaker, the so-called "near-home sectors", where invalids, pensioners and mothers may work at shops located near their homes for several hours a day, must also be developed in the future.

The speech presented by USSR Goskomtrud Sector Chief V. Roik gave rather comprehensive information on the essence and advantages of the work-shift method of work, the work and rest schedule applied under this method, and the prospects for its development. At the present time in Western Siberia alone there are 200,000 people working under this system, and over 300,000 throughout the country as a whole. Throughout certain ministries the relative share of work performed by the shift method has reached 20-30 percent, and in the Ministry of Construction of Petroleum and Gas Industry Enterprises this figure has reached 40-45 percent. This is a great achievement, considering the fact that the possibilities for its introduction are not everywhere present. Specialists have computed that it yields a savings in capital investments in the non-productive sphere alone of approximately 2.5-3 billion rubles for the five-year period throughout the regions of petroleum and gas extraction. The economy of current expenditures comprises no less than 250 million rubles per year. The main advantage of the shift method of labor organization consists of the fact that it is aimed toward the achievement of end results in optimal times. It is directed toward the intensive mastery of natural riches and the comprehensive development of the economy of remote regions, and it significantly increases the mobility of labor resources.

V. Roik devoted much attention to an analysis of the work and rest regimens used under the shift method and their development. In developing the base regimens, he believes, various factors must be considered, particularly those such as the peculiarities of work in small isolated collectives, the social consequences of prolonged absence from one's family, medical-biological consequences of adaptation to new, often contrasting natural climatic conditions, etc. In the opinion of the speaker, an increased radius of supply, if it is associated with a change in the habitation environment of the person, requires a longer shift duration if there is increased contrast in the natural conditions. At the same time, the social aspects of personal relations within the family are oriented toward reducing the shift duration or prolonging the periodic

rest times. The family status of workers motivates them to express a desire toward a more intensive work regimen for the purpose of prolonging the time spent with the family. Among the production factors which must be considered are the distance for which the personnel must be transported, the seasonal nature of the work, the requirement of its reliable fulfillment, and the attained level of rhythm in production. The work and rest regimen is most greatly influenced by expenditures on transport and limitations of labor resources.

Despite the high degree of specification of the regimens in the corresponding recommendations and documents, it is impossible, in V. Roik's opinion, to fully consider the individual requests of the workers under the changing conditions of production and construction. Therefore, questions of establishing intra-shift and inter-shift daily routines of the on-duty personnel should be resolved with consideration of the local conditions on the basis of medical recommendations and base regimens directly at the on-site villages.

* * *

In the opinion of numerous participants of the seminar, it was meaningful and interesting. The speeches presented much new and previously unpublished information on the problem under discussion. An acquaintance with the leading experience in the introduction of new forms of work time organization and with the basic methodological recommendations for their implementation will make it possible to significantly expand the scope and increase the effectiveness of this work.

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RECOMMENDATIONS FOR COLLECTIVE CONTRACTS IN LIVESTOCK SECTOR

Moscow ZHIVOTNOVODSTVO in Russian No 4, Apr 84 pp 60-62

[Article, untitled, by V. P. Protasov, deputy chief, Main Administration for Labor and Social Problems, USSR Ministry of Agriculture, under the heading: "Advice"]

[Text] In order to provide wider dissemination of the collective contract in animal husbandry and to render practical assistance to agricultural supervisors and specialists, the USSR Ministry of Agriculture, in conjunction with the USSR State Committee for Labor and Social Problems, and the AUCCTU, has given their approval to "Recommendations for Organizing a Collective Contract in the Animal Husbandry Subdivisions of Kolkhozes and Sovkhozes."

We shall set forth the basic tenets of the indicated recommendations.

The collective contract meets the present needs of production much more fully; it promotes the solution of economic and social tasks, and the development of democratic principles in management; it strengthens technological and labor discipline, increases creative initiative, and inculcates the feeling of collectivism.

The following principles must be observed in the formation of contract brigades and links in their activities: voluntary participation; the permanence of the collective; the use of collective payment for end results, depending on the quantity and quality of output produced, taking into consideration the personal contribution of each worker to the overall results; the optimum strength of a collective; the independence of the collective in solving production and labor problems; and the outfitting of the brigades and units with equipment, material and monetary resources.

In order to observe the democratic principles in control of production, it is necessary to establish a brigade (link) council in each brigade (link), and a council of brigade leaders on each farm.

The basic document which regulates the relations between the brigade and link working under a collective contract and the farm administration is the

contract, which reflects the rights and responsibilities of both parties, as well as the production targets for the contracting subdivisions.

Various forms of the collective contract may be used in animal husbandry: the brigade, the link and also the brigade-link form. In choosing the most rational form of the organization of the labor of the contracting subdivision one should take into consideration the peculiarities of the branch which have a direct influence on wages and organization of labor.

On large farms, complexes and poultry farms with a complex production structure the brigade-link form of collective contract may be used. In such subdivisions contract brigades are established within which specialized links are organized for taking care of different groups of animals and for carrying out various kinds of work within the brigade or the link.

Mechanization specialists who haul in animal feed, veterinary specialists, workers in the feed shops and other services and auxiliary functions may be assigned both to an independent collective or they may be a part of the contract subdivision directly responsible for care of the animals.

For the brigade-link form of collective contract, internal cost accounting must be defined for each separate subdivision.

Successful work with the contract collectives is to a large extent determined by the proper and skillful use of material incentive measures for the livestock specialists.

In the subdivisions which work on contract, labor payment is made on the basis of rates for output (for gains in live weight, milk, wool, eggs, birth of young, etc.).

Calculating the output rates is accomplished according to the system stipulated in the Standard Statute for Paying Wages to Sovkhoz Workers and at Other State Agricultural Enterprises, approved by the decree of the USSR State Committee on Labor and Social Problems [Goskomtrud] and the AUCCTU, of 8 May 1981, No 135/11-4, as amended and supplemented. At the same time the indicated rates are calculated on the basis of the annual norm for production of output and the wage fund, increased by up to 150 percent depending on the level of productivity for cattle and poultry.

In defining the production norm, animal productivity is established on the basis of the level achieved for the preceding 5 years for the farm as a whole (providing the production conditions are the same for all the livestock sections of the farm) or else for a given livestock section.

In case of a change in production methods, the degree of mechanization, an improvement in the basic herd with significant strengthening of the feed base which supports increased animal production, the rates established for output must be reviewed.

The basic wage fund for the year (or for a period of time) for a contract collective is determined on the basis of the existing technically-grounded

norms for caring for the animals (the norm for time, or for output), and on the basis of the appropriate basic wage rate.

Shown below is a sample computation of a collective basic wage fund:

Sample Computation of Annual Basic Wage Fund
for the
Collective of a Brigade Employed at Fattening Cattle
(on a farm with 3,000 head of cattle)

<u>Profession</u>	<u>Number of Workers (persons)</u>	<u>Wage Cate- gory</u>	<u>Basic Wage Rate Rubles--Kopeks daily</u>	<u>hourly</u>	<u>Basic Wage Fund (Rubles) per wrkr</u>	<u>all wrkrs</u>
Operators (stockmen)	8	4	3-67	--	1339.55	10,716
Duty Livestock Specialists	2	3	3-37	--	1230.05	2,460
Tractor Drivers for Hauling, Distrib. Feed	2	4	5-60	--	2044.00	4,088
Feed Kitchen Workers*	3	4	3-67	--	1339.55	4,019
Mechanics*	2	4	--	0-566	1446.13	2,892
Veterinary Specialists*	2	4	3-67	--	1339.55	26,799 [sic]
Brigade Leader	1	5	4-78	--	1745.00	1,745
Total	20					28,599

*The question of establishing wage additions for output for feed kitchen workers, mechanics and veterinary specialists is resolved by the sovkhos director and the trade union committee.

The "Temporary Indicators for Agricultural Crop Yield and Productivity of Cattle and Poultry, with the achievement of which the basic wage fund for workers employed in animal husbandry and crop production, for the determination of rates for output (for a given crop or type of output), may be increased by up to 150 percent under the job contract plus bonus and up to 50 percent under the piece rate plus bonus systems of labor payment; and conditions for increasing this fund," approved by the USSR Ministry of Agriculture and other departments, can be used as a guide in determining the amount of payment for output.

Rates for output may be established uniformly for the year or may be differentiated by the period of the year.

Output rates for a contract collective employed in fattening cattle are cited as an example. The by-the-job rate in this case is established for each centner of gain of live weight. The brigade collective which is employed in fattening calves is assigned the following planning indicators: for a collective assigned 3,000 head of cattle according to technically-based norms, average daily growth for calculating production norm is 600 grams; gross product output is 6,570 centners; and the basic wage fund is 28,599 rubles.

The output rate is determined on the basis of 130 percent of the basic wage fund. For calculating the rate per centner of increase, the basic wage fund

for the collective amounts to 37,179 rubles. The rate per centner of increase will be 5 rubles, 66 kopeks.

Different variants of payment for output are possible for dairy cattle rearing.

In the absence of individual accounting for product output (when milking cows at milking lots such as the "yelochka" [little fir tree], "tandem" or "karusel'" [carousel] and so on), two rates may be established (one for the milking link and another for the other brigade workers), or, a common one for the whole contract collective. When individual accounting is used for the milkers' production output from the herd of cattle assigned to them, rates are established separately for the payment of the labor of the milkers for output, as well as a unified rate for payment of the labor of other workers in the contract collective (stockmen, mechanics, feed kitchen workers, brigade leaders, and others).

Payment of the labor of members of contract collectives may also be made in accordance with progressively increasing rates for output. For the purposes of calculating the indicated rates, included in the wage fund for all the workers in the collective is a planned basic wage fund, increased by 25 to 50 percent, additional (incentive) pay for increasing animal productivity, bonuses for production and, if necessary, a portion of the assets from the material incentive fund.

Calculating progressively increasing rates for output in animal husbandry is conducted according to the method approved by the USSR Ministry of Agriculture, in cooperation with USSR Goskomtrud and AUCCTU.

Cited as an example are collective progressively increasing rates for output in separate branches of animal husbandry, taken from the method indicated above.

Progressively increasing rates for output are determined on each farm based on the specific production conditions.

As a rule, rates for output are established for a period of years. However, if the production methods have changed, if the cattle have been replaced by more productive animals, and also if an improved feed base provides higher animal productivity, the established rates must be revised. But in revising the rates, the wages must not be allowed to increase at a higher rate than labor productivity.

Prior to the final calculation for output, wages are paid to the members of the contract collective in the form of an advance.

In the branches where output is received at the end of a production cycle (raising and fattening cattle, raising hogs or sheep, on fur farms and so on), advances are paid periodically, based on the basic wage fund for the entire volume of basic and auxiliary work in caring for the animals assigned to the collective (according to established norms for service, output, time) for the appropriate period.

Rates for Payment of the Labor of the Members of a Brigade
Employed in Raising Cattle

<u>Average Daily Growth of One Animal (grams)</u>	<u>Progressively-Increasing Rates per Centner of Growth (rubles-kopeks)</u>
up to 600	5-66
600.1--650	5-96
650.1--700	6-27
700.1--750	6-57
750.1--850	6-88
800.1--850	7-18
850.1--900	7-49
over 900	7-80

Distribution of periodic advances at the discretion of the collective (council), brigade or link can be made equally for the amount of work time or by means of crediting wages to each member of the collective according to the basic wage rate which corresponds to the work he has performed. In this case, the index of labor participation [Koeffitsient Trudovogo Uchastiya (KTU)] is not used.

The collectives may also carry out the planned volume of work with fewer workers than the normatives (plan) call for. However, in order to avert excessive increases in the workload for a member of the collective at the expense of the growth of animal productivity, the monthly advance credited to a worker should not exceed the basic wage fund of those actually working and up to 30 percent of the amount of savings from the basic wage fund. Distribution of the amount of the savings indicated among the members of the collective can be made with consideration of the KTU.

In those branches where output is received constantly (raising dairy cattle, poultry egg farming, etc.), the workers' wages are in all cases paid for output. At the same time, advances are not made (except in cases where progressively-increasing rates are employed).

When progressively-increasing rates are employed, advances during the course of the year are made according to a rate for output calculated on the basis of 125 percent of the basic wage rate (or the basic wage fund) and the annual norm for production output (per worker or per collective). Rates for output can be established uniformly for the year or may be differentiated by period of the year in accordance with the existing "Standard Statute for Wages for Sovkhoz Workers." When there is individual accounting, the advance in accordance with the indicated rate is credited to each worker for the output produced by him in a given month. Where individual accounting is not used, the advance credited according to the rate for output is distributed among members of the collective proportionally to the amount of time worked. KTU can be employed by decision of the brigade council.

Persons who have been awarded the title "Master of Animal Husbandry," Class I and II, are paid the established supplement to their wages, both as an

advance and for the final wages for output. The amount of these supplements is not considered when distributing the collective wages (advance).

When the production cycle (year, period) is completed the collective is credited with wages for the actually produced and received output according to the established rates. From the amount of wages credited for output, the advance paid during the accounting period is withheld, and the difference is distributed among the members of the collective.

In accordance with the indicators established on the farm, the collective is credited with output bonuses, except in those cases when progressively-increasing output rates are used in paying the workers' wages. The sum of the wages and output bonuses credited to the collective of the brigade or link are distributed among the workers in the following manner: in collectives where advances are distributed taking KTU into consideration, in proportion to the advance received; in collectives where workers are paid advances without taking KTU into consideration, the amount of wages for output may be distributed both taking KTU into consideration and not taking it into consideration. The system for distribution of collective wages taking KTU into consideration is in this case the same as for distribution of an advance.

In addition, it is recommended that contract collectives be paid bonuses for reduction of direct expenses per unit of output or for reducing production costs in comparison with the plan (target) in an amount up to 40 percent of the amount of the savings received. Bonuses may be paid not only for savings in expenditures on the whole, but also for such important elements as savings in feed while assuring growth of animal productivity.

Bonuses for output and savings in direct expenses may not exceed the established limits.

In order to strengthen the material interest and responsibility of the contract collectives in rational use of material and monetary resources it is recommended that additional bonuses be established for cost savings, at the expense of the farm's material incentive fund, and also to reduce the amount of these assets for a given collective when the established expense limits are exceeded.

The question of the expedience of employing KTU when distributing collective wages, and also the system for establishing KTU in each concrete case, are resolved by the brigade (link) council. Collective wages for output may be distributed among the members of a collective taking into consideration the amount of time worked, the amount of combined work, the labor contribution of each worker to the overall labor results, and other indicators.

It is expedient to establish KTU for the workers in two stages. At the beginning of the year (or when the contract collective is organized) a base amount of KTU is established for each worker (as a rule, equal to 1.0), which, when wages for output are distributed (monthly, or during the final reckoning), is adjusted depending upon the concrete work indicators or the work attitude of each member of the collective.

Adjustment is made by means of increasing or decreasing the base KTU (equal to 1.0), depending on the level of labor productivity and intensiveness of the labor of each member of the collective. At the same time the following factors for increase and decrease are taken into consideration:

<u>Factors for Increase</u>	<u>Amount of Increase in KTU</u>
High labor productivity (in comparison with other workers in the collective; carrying out work of varying complexity; combining professions and expanding one's zone of responsibility	0.1-0.5
Introduction and assimilation of new, more sophisticated work methods, rationalization and innovativeness	0.1-0.4
Actively carrying out the functions of a tutor and passing on one's production experience and skills to young workers	0.1-0.3
Preventing damage to machinery or mechanisms; preventing animal deaths, etc.	0.1-0.2
<u>Factors for Decrease</u>	<u>Amount of Decrease in KTU</u>
Insufficiently high labor intensity and productivity in carrying out production processes	0.1-0.5
Careless use of means of production, connected with damage to machinery and mechanisms, injury to animals, etc.	0.1-0.5
Insufficiently conscientious attitude toward labor; instances of violating labor and technological discipline	0.1-0.5
Unsatisfactory condition of animals serviced or equipment assigned; violations of safety regulations	0.1-0.2
Instances of not carrying out the instructions of the brigade or link leader, or those of specialists	0.1-0.5

From the above list of indicators and conditions (each collective can stipulate its own indicators as well) several indicators are chosen (4 or 5) in accordance with which a general assembly of the collective establishes definite norms for adjusting the base KTU. Other conditions are also possible for increasing or reducing the KTU; for example, increasing the base KTU by 5.0 percent for each innovative suggestion, or reducing the KTU by 5.0 percent for each instance of violating labor discipline, etc.

At the same time a maximum norm must be stipulated which limits an increase or decrease of the base KTU; for example, not by more than 50 percent. However, a general meeting of the members of the collective should have the right in exceptional cases to stipulate higher norms for increasing or decreasing the base KTU.

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EDUCATION

DEBATE ON QUALITY OF ENGINEER TRAINING CONTINUES

Engineers for Plants

Moscow SOVETSKAYA ROSSIYA in Russian 6 Apr 84 p 3

[Article on round-table discussion conducted by SOVETSKAYA ROSSIYA special correspondent Mikhail Kushtapin: "The Diploma Is Not Yet a Crown"]

[Text] In December of last year SOVETSKAYA ROSSIYA launched the new heading "The Engineer of the 21st Century." The problems of the training of engineers, who meet the requirements of the new stage of the scientific and technical revolution, have been raised in the publications. Today we offer to the attention of the readers the round-table discussion which the editorial office conducted in Krasnoyarsk. Two rectors and two directors took part in it: V. S. Sokolov, rector of Krasnoyarsk State University; A. M. Staver, rector of Krasnoyarsk Polytechnical Institute; M. Ye. Tsaregorodtsev, general director of the Sibtsvetmetavtomatika Scientific Production Association; V. P. Shapovalov, director of the Divnogorsk Plant of Low-Voltage Equipment.

The Plant Is Waiting for the Specialist

V. Sokolov: Viktor Prokof'yevich, so what complaints do you as a director have about graduate engineers?

V. Shapovalov: Oh! You know about them no worse than I do.

V. Sokolov: But still? For you and I are looking at the training of an engineer from different points of view.

V. Shapovalov: But no matter which one you look from, all the same the question arises: What did they teach him at the institute in 5 years?

M. Tsaregorodtsev: We know that yesterday's student is good at shining with erudition in the most different fields. But it is worth probing him a bit deeper, since when it comes to the test it often turns out that his knowledge

is not extensive: he seems to have an idea about everything, but has a proper idea about hardly anything.

V. Shapovalov: Here it turns out: for 5 years he studied, but knows how to do very little with respect to machine tool attachments, did not receive the necessary skills of designing work, has a poor idea about economics in general and about the organization of production in particular.

V. Sokolov: How can we, Anatoliy Mikhaylovich, respond to the angry directors?

A. Staver: Higher educational institutions also operate according to strictly regulated curricula and syllabuses, but much of what our companions have spoken about is not yet envisaged in them.

V. Shapovalov: It is turning out to be interesting. The rectors are well aware that they are preparing for the national economy inadequately trained engineers, and they continue to calmly prepare them, they say, what are you to do, we have such imperfect syllabuses.

V. Sokolov: Not the higher educational institution, but the Ministry of Higher and Secondary Specialized Education draws up and approves the plans. In many ways we have only to strictly fulfill them.

M. Tsaregorodtsev: Poor syllabuses? It is necessary to draw up new ones which are in full accord with today.

A. Staver: We have already drawn them up. We are now operating in accordance with the new curricula. But about 10 years have passed since they were drawn up and approved.

V. Sokolov: These new curricula with respect to several subjects have become obsolete, without yet having had time to arise. They not only did not bring the educational process closer to today, but, on the contrary, created an even larger separation from the needs of scientific and technical progress. In them, for example, the syllabuses on physics, mathematics and other basic fields of knowledge were shortened significantly. But without a thorough fundamental training it is not at all possible today to speak about a skilled specialist.

V. Shapovalov: Why do the rectors not put the question point-blank to the Ministry of Higher and Secondary Specialized Education: it is not reasonable to operate today in accordance with such syllabuses.

V. Sokolov: Here, I believe, we and you will not disclose anything new to anyone. The shortcomings in the training of engineering and technical personnel have been discussed for a long time in the collegiums of ministries, at conferences of workers of the higher school and in the press. The question, Viktor Prokof'yevich, has already been posed point-blank by life itself. It cannot be said that the Ministry of Higher and Secondary Specialized Education is not doing anything on this level. It is possible to name the Moscow Physical Technical Institute, Novosibirsk State University,

the Ivanovo Power Engineering Institute and the Taganrog Radio Engineering Institute, about which SOVETSKAYA ROSSIYA has told, and a number of other higher educational institutions, for which the task has been posed to ensure the training of specialists, who combine fundamental knowledge with a high occupational level and skills of work in a specific sector of the national economy. There both the syllabuses and the entire educational process are being adjusted truly flexibly and efficiently by today and its needs. It is another question that for the present this is still the privilege of individual higher educational institutions, an experiment, and such a graduate will not yet arrive soon, for example, at your plant.

V. Shapovalov: Thank you. You have raised my hopes. I, perhaps, would also wait, but the plant is not able to wait, it is operating.

The Quality of the Education

A. Staver: The experiment, the innovation, the adjustment of syllabuses--all this is good. We have quite a number of higher educational institutions which are training excellent specialists. And all the same from the standpoint of today and especially tomorrow we have the right to pose the question about the fundamental reform of the entire educational and training processes and all the scientific, production and pedagogical activity of the higher educational institution. The essence of the problem does not lie even in the obsolete programs of instruction. Here I utterly and completely agree with the article of Georgiy Kulagin in SOVETSKAYA ROSSIYA. The shortcoming of the higher technical school lies in the fact that it lags to a certain extent behind production needs and the scientific and technical topic of the day.

V. Sokolov: Quite correct. Today the higher educational institution is closed in its own departmental shell. The Ministry of Higher and Secondary Specialized Education evaluates the work of the educational institution. The progress in studies, the drop-out rate, the plan of graduation, the plan of assignment. The well-being of the higher educational institution depends on these here percentages, they also judge from them the quality of the training of specialists. Well, do not be surprised. The alma mater reports back not for the specialist, but for the student.

V. Shapovalov: Excuse me, but if I, assume, by chance got into an institute. I do not want to learn, I cannot. It is clear to everyone that I will not make any kind of engineer, why, then, are the professors to do their utmost to get me to a diploma?

V. Sokolov: From your point of view, perhaps, it is also foolish, but put yourself in my position: if I give a lazy bones a "two," they will give me to understand that not everything is all right for you with the progress in studies, Veniamin Sergeyevich, if I have dismissed a remiss, incapable student, they say to me: you have a rather high drop-out rate, you are upsetting the state plan on the graduation of specialists. And frequently the conversations on the increase of the quality of the training of specialists are confined to the notorious percentages of progress in studies, the drop-out rate and the number of graduates. But, in my conviction, it is necessary to make not percentages, but the actual quality of training the cornerstone.

V. Shapovalov: Indeed, what do I need 10 "raw" and "dull" specialists for-- give me one, but a real, capable engineer. Strict requirements and the elimination of those, who do not meet them, guarantee the high quality of those who have reached the finish line. For the present, according to my observations, of the graduates, who come to my plant, far from all can become skilled specialist. Those, who have received a good basis at a higher educational institution, display the necessary intellectual curiosity, poke their nose into everything by themselves, want to understand and find out about everything and continue to engage in self-education. It is not enough that many judge everything superficially, they are also people who are completely indifferent and alien to their occupation. Nothing worries them, they treat their duties indifferently, stayed the fixed hours and joyfully ran outside the gate. There is no aspiration for occupational growth, even a career and advancement along the service ladder do not interest them. Here is what is surprising and troubling.

A. Staver: I am also on the side of those who advocate making elimination stricter. If a student does not want to learn or cannot learn, give up his place to a more worthy one. The percentage of elimination should not cast suspicion on the quality of the educational and pedagogical activity of instructors. At the same time under our socialist conditions it is impossible not to consider it altogether. If at my institute only 50-60 percent of the students get a diploma, they have the right to ask me: Who are you accepting for the first year? It is simpler to dismiss a remiss student than to find "one's own" school graduate who would study not out of fear, but conscientiously.

M. Tsaregorodtsev: I want to speak about a different thing. Here at the Sverdlovsk Mining Institute from the first through the fifth years inclusively all the students received working class occupations. Much attention was devoted to practical lessons. In each year the future engineer should have obtained skills in some working class specialty. I, for example, along with the diploma of an engineer received at the institute the skills certificates of a blaster, a timberman, an electrician and a drift miner of the 7th category. We did not have problems with what to engage in during practical production work.

V. Sokolov: At the Moscow Physical Technical Institute they also conferred on me the categories of a lathe operator, a fitter and a draftsman. And, it must be said, all this was envisaged by the curricula.

V. Shapovalov: Today's young engineer considers it below his dignity to take a hammer in his hands, while if he does take it, I am afraid he will hurt his finger. In the personnel division he is registered as an engineer, but he himself asks the workers what one part or another is called.

V. Sokolov: But except for the workers he often has no one else to ask about this. The instructors of some higher educational institutions are themselves familiar with the modern plant and with production economic, scientific and technical problems from newspapers and television broadcasts. Here is your typical way to becoming an instructor of a higher technical educational

institution: a diligent school child, an industrious undergraduate, a graduate student, a candidate of sciences, an instructor in a chair, a docent, a doctor of sciences, a professor, a head of a chair. From where would a respected professor know production and technology, he has no time to go to the nearest plant, and there is no need to leave during his entire life.

A. Staver: I cannot but cite another sound conclusion of Georgiy Kulagin from the article in SOVETSKAYA ROSSIYA. Such a way to becoming an instructor is good for purely theoretical disciplines of the physics and mathematics cycle. But experienced workers, who have been endowed with the pedagogical gift, should be attracted more for the engineering sciences. But try to bring to an institute a highly skilled specialist, who could give his own course through the combination of jobs--you will immediately stumble over continuous restrictions, which for over 20 years now have ordered to have among instructors not more than 2 percent who combine jobs.

V. Shapovalov: Perhaps I am exaggerating, but it seems to me that the established situation of the higher school consists in the fact that it lacks serious stimuli to display great interest in the quality of engineering training.

The Motive Forces of the Scientific and Technical Revolution

A. Staver: I believe that the essence of the problem lies in the fact that the higher technical educational institution at times is closed in its own shell and shuts itself off with textbooks, syllabuses and internal indicators from reality. But it is a matter not only of it. It would also be glad to throw open its auditoriums and laboratories to meet scientific and technical progress--and often it does not have for this either a physical production or a scientific and technical base. You called attention to the fact that nearly all the authors, who have been published on the pages of SOVETSKAYA ROSSIYA under the heading "The Engineer of the 21st Century," agree in one thing: the engineer of the new type is not to be trained in isolation from modern production, science and technology. But where will the student become familiar with them, if the higher educational institution does not have a serious experimental production and scientific base?

V. Sokolov: Indeed! We still frequently train students on obsolete equipment which has been written off by enterprises on account of unfitness.

A. Staver: But a modern physics or chemistry laboratory costs neither more nor less--1 million rubles. Where is the higher educational institution to get these million rubles? Here it closes itself in the walls of its auditoriums in order to explain the same physics on a blackboard.

V. Sokolov: Imagine even the following: the rector went and found the million. Where will he buy a modern laboratory or the other necessary equipment? Everyone should not count on the Ministry of Higher and Secondary Specialized Education: given its meager funds and limits, at which all the higher educational institutions of the country are looking with hope, it is possible to wait a long time for a special-purpose delivery to you. The State Committee for Material and Technical Supply does not serve us at all--we are

insignificant clients for it. Industry, local plants and associations remain. But not one director for all the respect for the institute will give it modern equipment. Why?

V. Shapovalov: I have not yet received it, but the ministry has already sent out a plan for it. And as much as I would like, I cannot give it to you, I do not have the powers and grounds for this. Only with the personal order of the minister. But if I utter a word about this before the minister, I will not see new equipment any more. The rumor will go about the entire sector that Shapovalov does not need new equipment: he gives it to higher educational institutions.

M. Tsaregorodtsev: Forgive me for the reminiscences, but there was a time when the institutes first of all, without fail, by special allocation and a separate line received the very latest models of machinery and equipment. At the same Sverdlovsk Mining Institute we learned to work at machine tools, machines and lines, which were not yet in industrial use. Our higher educational institution had the most solid authority. It led the sector and set the tone for everything new and advanced.

A. Staver: That is how it should be. Previously, when the slogan "Personnel Decide Everything!" resounded in the country, the higher school was actually placed in the front line of science and technology. Now we are somehow forgetting this slogan, and all the attempts of the higher educational institution to follow a modern route--not in order to lead, but only to keep pace with life--often run into a categorical: "For the present there is no possibility!" But it is a truism: the capital invested in education yields the largest profit. And it must be admitted that the training of an engineer under present conditions is becoming more and more expensive, and, no matter how you try, there is nowhere for us to escape this, if we really want to train highly skilled engineers.

V. Sokolov: Which of the rectors has not heard such arguments: we would be glad to help, but there is nothing to help with, we cannot divert assets for the higher educational institution from the national economy. But is the training of engineering personnel really not a national economic task? It seems to me that a prerequisite of the problems of the higher school consists in the fact that education is assigned to the nonproduction sphere. I am sure that in the future we will arrive at the need to include the entire system of public education in the budget of the production sphere and to regard vocational training as a vital national economic task.

V. Shapovalov: The state will never have extra money. Both in the future and now it is necessary to be able to count it, to invest it intelligibly and with the greatest effectiveness and to manage practically what there is. I am convinced that given the present state of affairs and the same resources higher educational institutions could operate with greater efficiency. I have discussed this theme more than once with colleagues. It is, perhaps, even more painful for us than for the higher educational institution. Judge for yourselves. Every year I receive fresh engineering forces by way of assignment. We have already spoken about the quality of training. I will speak of the fact that half of the graduates do not reach Divnogorsk. We have

only just brought them up to working condition, when they wave goodbye to us. Not the plant, but the freight handling base or 3-year courses for the improvement of engineering skills. And such a picture for Siberia is not isolated. So then, many directors of plants and associations are willing to agree to certain expenditures for a specific higher educational institution, to invest their own assets in it, to share everything in which they are themselves rich and to set up a modern production base, but on the condition that the institute compensates for what has been spent and invested in it, first, with real output, which it will produce at the plant base, and the development of the latest equipment, processing methods and materials and, second, with the special-purpose training of specialists. Both the plant and the higher educational institution will merely gain from this. The institute will obtain the opportunity to train specialists under realistic conditions, on advanced equipment and an advanced processing method. The future engineers will be able to show their worth in practice and to show who is capable of what and inclined more to what. With allowance made for individual qualities it will be possible to differentiate the further training and to give a more narrow and thorough specialization. As you see, the version is an entirely practicable one, which does not require special state capital investments--it is entirely possible to manage with what the enterprise and the higher educational institution already have. While it promises, in my opinion, a considerable profit.

A. Staver: Incidentally, Viktor Prokof'yevich and I have come to the agreement to open starting with the new school year a base chair at the plant.

V. Shapovalov: An affiliate of the chair, and not the production base, about which I spoke, and it will not eliminate all the "engineering" problems for the polytechnical institute. But as for the plant, this is already a real reinforcement with specialists, in the training of whom we will take a most direct and interested part. We plan to receive 50 of "our own" engineers a year. It is clear that on the scale of the state this is a drop in the ocean, and not a solution of the problem of training the specialist of the new type. But for me personally this already is even though a small, yet a real step toward the engineer of the 21st century. How is it poor? In the next century he will not all the same fall to me from the sky.

A. Staver: At a recent meeting of the Collegium of the RSFSR Ministry of Higher and Secondary Specialized Education the following figures were cited: about 90 educational scientific production complexes, 4 educational scientific associations and more than 260 affiliates of chairs, which have been set up at enterprises and scientific research institutes, are operating under the auspices of higher educational institutions of the republic. Is this good? Of course it is good. But, in my opinion, it is time also to take cardinal steps on the solution of the fundamental problems which are connected with the training of engineering personnel. The engineer of the 21th century is not the distant future, but our present. He is already, consider, going to the first grade, in 10 years he will come to enroll in a higher educational institution. How would I like to see the institute for him? As a large educational, scientific and production complex. No, I am not speaking about the educational scientific production combines, which are being set up in some cities on the basis of the cooperation between higher educational

institutions. (The newspaper has covered in detail the experience of Tomsk higher educational institutions. Necessary, interesting experience. But then such a question suggests itself today: Why initially set up tens of institutes which are isolated from each other, in order then to attempt to organize them into a single whole?) It seems to me that in the future we will all the same seek a way out not in the cooperation of higher educational institutions, but in one giant higher educational institution with a student body of 100,000-150,000, with its own unified, most powerful and most modern production engineering and technical base. I foresee the cries of skeptics: "But where is one to get the assets for such giant complexes?"

What is one to reply here? For we are finding the money to open newer and newer institutes and their affiliates. The matter once again, if you consider it seriously, comes not so much to money and material resources as to their wise, practical, worthwhile use.

M. Tsaregorodtsev: If you approach it practically, one should measure every matter not by how many rubles it will cost, but by how much and what it will yield.

A. Staver: The saving on the quality of the education and training of specialists turns in the end into irrecoverable losses, the true value of which it is very difficult even to calculate. If you argue from the standpoint of zealous managers, who worry about the state kopeck, then why, one would like to know, have in the same Krasnoyarsk a good 10 higher educational institutions which train engineers? It is no secret that their scientific and technical base and potentials leave much to be desired. Is it not better, is it not more profitable and, finally, is it not less expensive for the state instead of 10 institutes to have in the city 1 institute, which would absorb all the assets and resources, which are dispersed among 10 addresses?

V. Sokolev: I will add that such giant higher educational institutions will be able not only to influence scientific and technical progress directly, through the training of specialists, but also to work directly for science and technology, being transformed into real generators of ideas and motive forces of the scientific and technical revolution.

Institute Affiliates at Enterprises

Moscow SOVETSKAYA ROSSIYA in Russian 27 Apr 84 p 2

[Article by Doctor of Agricultural Sciences Ye. Murakhtanov, rector of the Bryansk Technological Institute (Bryansk): "The Chair in the Shop"]

[Text] Modern production requires of the engineer scientific research, designing and renovation skills and planning experience. How are these qualities to be inculcated? Such work, clearly, is not within the capability of the higher educational institution alone. Only together with enterprises is it possible to achieve the desired results. I support the idea, which has already been expressed in the articles under the heading "The Engineer of the 21st Century," that it is advisable to have at base plants affiliates of

chairs. The need for their creation stems from the fact that the processing method of any works is now updated in the course of 5-6 years. It is very difficult for the higher educational institution to keep up with such a pace: the textbooks become obsolete already before they get into the hands of the students. At the affiliates the students, in addition to textbooks of a general nature, will draw all the fine points of production directly from practical experience and the technical specifications. The students will spend a significant portion of their study time at the enterprise, the theme of the graduation project will be known to everyone in good time, the questions of the introduction of the results of these works will be eliminated.

The setting up of affiliates or base chairs will make it possible not only to enlist in teaching prominent scientists and production workers, but also to use more completely the modern production equipment and to involve students in the most urgent research and production situations. The following is seen: an impressive educational laboratory base attached to the affiliates of chairs, which are furnished with hardware components up to computers, with simulators and modern equipment. The expenditures of the enterprise will be repaid a hundredfold, they are invested in its own production, and are not transferred somewhere on the side. One must also not forget the rapid occupational advancement of young engineers and their great creative efficiency.

The affiliates of chairs at the enterprise are the training and advancement of those who teach the students--the leading commanders of the given works. By enlisting in work in such a chair the managers of divisions, bureaus and shops, we prompt them to the extension of knowledge. The chair is becoming a scientific and technical center at the enterprise. The production level of instructors of a higher educational institution can be improved here. The advantage of the affiliates of chairs lies in their flexibility and ability to respond quickly to the demands of science and production. Here it is possible to attach students to ideas from their very origin and to their implementation, they will begin to familiarize themselves more actively with the vital problems of technical progress. The point is that the financing of student design bureaus is usually carried out in accordance with economic contracts with enterprises, as well as by means of state budgetary assets by way of course and graduation designing. Now, when more and more graduates of vocational and technical schools and skilled workers, who have graduated from the preparatory departments, are coming to higher educational institutions, the opportunity has appeared to broaden the framework of design and student planning bureaus with the assistance of the chairs directly at the works. True, the mass involvement of students in scientific research and design and planning work can also have dark sides--being carried away by this, they begin to avoid production, the organizational aspect of the matter is a burden on them, troubles with the equipment and other disorders stump them. Here instructors and tutors from the works should stand guard.

Finally, the specialist of production needs time for the constant addition to his resources. The affiliate of the chair can simplify and speed up this process. It is essential that people, who have been trained by the same

higher educational and production school, would manage production; people here rubbed each other, a management nucleus formed among them.

Affiliates of the characteristic chairs, I believe, should also be opened at the associations, scientific research institutes and design bureaus, which are in the front lines of scientific and technical progress, it is within their power to organize the technical supply of the educational process, as the higher school requires. The chief engineer of the enterprise can head such a chair, in addition to him another two or three docents and the chiefs of the design bureau, the technical division and laboratories should constantly perform work here, the leading specialists of the institute and the works should give lectures. The instructors and specialists will be able to engage more actively in research, experimental and planning and design work, as well as to participate in the practical introduction of the results of these types of work and to supervise the fulfillment of practicable course and graduation projects on urgent themes or the assignments, which have been envisaged or planned by the enterprise or association. The need for this also stems from the fact that in our country the degree of specialization of higher education is one of the highest in the world. Today at the higher educational institution it is impossible to instruct students only in accordance with books or even in accordance with reliable recommendations and inanimate personal experience.

The established system of the supervision of science of the higher educational institution is more of a moderating than a stimulating nature. It should be noted that the established cost accounting scientific association in the system of the RSFSR Ministry of Higher and Secondary Specialized Education is not contributing to the development of science, especially at higher educational institutions, which have a volume of annual economic contractual scientific research of less than 1 million rubles, and is merely introducing a large amount of every possible additional correspondence. It is not carrying out the interdepartmental coordination of scientific research work, is not concerned with material and technical supply, is not studying the economic effectiveness of scientific developments and is content with merely reports or statements on what these higher educational institutions are doing now. As a result of all kinds of restrictions the higher educational institutions are forced to decline the conclusion of economic contracts for scientific developments for production. Therefore, although the scientific potential of higher educational institutions is great, it is not supported by reliable planning and, consequently, is poorly supplied and ineffective. Its legal, organizational and practical aspects, the procedure of financing, staff support, the reciprocal transfer and joint use of equipment and materials, the distribution of the profits and so on have not been worked out. And this is when the desire of production to cooperate with the higher educational institution is increasing more and more.

In my opinion, it is expedient to develop such contractual relations between enterprises and higher educational institutions, which would stimulate materially the effectiveness of the creative work of instructors and the interest of the works and would specify more clearly the rights and duties of the parties, the procedure of introduction, the publication of the results of research and the percentage of the estimated profit for the educational

institution. It is necessary to improve the system of the examination of proposals and the results of completed scientific developments and their introduction in production. For this it is necessary to determine the scientific type of each educational institution and its relations with academic and sectorial scientific research institutions and departments.

The greatest reserve of the increase of the effectiveness of science of the higher educational institution is its intensification and the shortening of the time of research by the more extensive use of equipment and the possibilities of production, the improvement of the creative atmosphere in the collectives of the higher educational institution and the enterprise and the increase of the interest of the enterprises themselves in the use of the recommendations of scientists. The level of use of the achievements of modern science of the higher educational institution at the enterprises of a number of sectors of the national economy leaves much to be desired. The inadequate development of the pilot experimental base, as well as the existence of departmental barriers are one of the obstacles in the way of the introduction of advanced technological processes. Enterprises should help the higher educational institution do in science what they and their sector, for which engineering personnel are being trained, need.

The division of higher educational institutions into state and sectorial institutions, institutions of union and republic subordination and their affiliation with various ministries and departments are at variance with the zealous economic management of them and the science of the higher educational institution. Here we see: different institutions at times in the same city train the same specialists and elaborate themes which are nearly identical scientifically.

The need has arisen for the regulation of the specialties for every educational institution with allowance made for regional, departmental and national economic interests. Every educational institution must have a strictly specified group of preferably related specialties, for example, construction, lumber, mining and so forth. A narrower group of related specialties for specific sectors of the national economy will make it possible to obtain in a special-purpose manner from specific departments, for which personnel are being trained, the latest models of machinery, equipment, instruments, standard reference documents and so forth. The traditional forms of scientific research work, which is carried out through the student society, are no longer adequate, although more than half of the students are encompassed by them. Our higher educational institutions have begun to saturate the entire educational process with elements of scientific research. The opportunity has appeared to give assignments, which follow from the needs of the enterprise which has sent the student to study.

For the support of the all-round relations of the higher educational institution and the works the conclusion between them of long-term contracts on creative scientific production cooperation seems very useful to us. The contract between the Bryansk Technological Institute and the Main Administration of Industrial Construction of the Bryansk City Soviet, which is of a comprehensive nature, can be named as an example of this. It encompasses all aspects of the joint, mutually interested activity of the collectives on

the path of scientific and technical progress. One of its results is the fact that in the Construction Faculty 60 percent of the students have been sent by the works.

In this respect the setting up, along with councils of rectors and councils of directors of enterprises, of scientific production councils, which consist of executives of the higher educational institutions and the enterprises, for which they are training specialists, also merits attention. Such councils should coordinate the joint actions of the interested executives on the acceleration of scientific and technical progress in the corresponding sectors of the national economy.

Educational Scientific Production Complex

Moscow SOVETSKAYA ROSSIYA in Russian 4 May 84 p 2

[Article by Doctor of Technical Sciences Professor A. Kalyayev, director of the Taganrog Radio Engineering Institute imeni V. D. Kalmykov: "The Student Longs for Work"]

[Text] Precisely what kind of specialist does the national economy need today? Yu. M. Solomentsev, rector of the Moscow Institute of Machine Tools and Tools ("The Engineer of the 21st Century," 11 December 1983), believes that the engineer of the new type should have a basic education and be able to solve major problems, and not only immediate tasks.

It is true, but, on the other hand, today the demand is not for an engineer in general, but for a highly skilled engineer, who would exactly fit the tasks and problems of a specific works. The question is merely where to get such a specialist. The graduates of higher educational institutions, as a rule, specialize, adapt themselves and frequently are retrained, so to speak, without leave from work, while working. Is it necessary to say that this is not the very best version?

What is to be done? In this respect I like the point of view of V. P. Kabaizde, general director of the Ivanovo Machine Tool Building Association ("The Robot... Teaches Creativity," 17 December 1983): "It is necessary to train specialists with a special purpose for specific enterprises and specific problems on the condition of a basic general training." But here another question arises: But is it, the institute training of an engineer in accordance with the custom order of a works, possible? If it is possible, in case of the present "wholesale" system of assignment you cannot be certain that "your" personal graduate will be assigned to precisely where they have directed him.

Let us open the handbook for enrollees. Our institute trains specialists in radio, computer and electronic engineering, microelectronics, the automation of control systems and other directions of science and technology, which are basic today. In other words, the future success of the technical progress of not only our, but also many other sectors of the national economy is founded in its walls.

It was possible, of course, to exist in the old way and to wait calmly, until someone else would set about the difficult reorganization or it, which is furnished for all events of life with meticulous methods letters, would be dictated from above. We reasoned otherwise, and about 15 years ago, without waiting for official instructions, began at our own risk to establish around the institute a substantial educational scientific production complex (UNPK). Now the educational institute itself, a scientific research institute of microelectronic computer systems, two special design bureaus, four scientific research laboratories, a computer center, a number of faculty scientific research divisions and laboratories, an experimental shop and four student design bureaus operate within it. The plan of a precision pilot production base has been drawn up and its construction is being carried out.

Did our forecasts and suppositions prove to be correct? It is possible to reply with all responsibility: yes!

We are now beginning specialization already in the third year, when the characteristic chair tries tactfully and considerately for the self-esteem of a young person to take stock of his abilities and inherent qualities and to select those, which promise the greatest creative flight and, hence, the largest practical return. In conformity with his individual qualities each student receives a technical assignment, which will pass through the planned theme of scientific research work and will end with a graduation project. The project, in turn, should without fail find practical application. The students of the last 2 years engage 1 day a week only in scientific research.

And still the institute complex was not able to replace the relations with real production. It was necessary to go resolutely to the sectors. We concluded 5 years ago the first contracts with the basic ministries, for which our graduates were intended. Creative cooperation links us with 27 enterprises. For the present the USSR State Planning Committee has approved these long-term ties symbolically, but once in a while the former methods of assignment operate, and our precisely oriented specialist, it happens, finds himself in such a place which you will not find on the map.

In support of special-purpose assignment we also organized five affiliates of chairs at base enterprises. The institute instructor, after all, remains in part a conservative--the syllabus and curricula all the same remain, no matter how often they update them. Now a highly skilled specialist from real production life comes to the institute auditorium and, as an equal with an equal, begins to speak with our students about today's and tomorrow's problems, tasks and plans. But then the conversation is continued in the shops and laboratories of the plant. Practical production experience also has a beneficial effect on instructors--for they must also keep pace. The enterprises have turned over to the affiliates of the chairs much equipment and computer technology and have equipped educational laboratory-scale plants.

As a result: the absolute progress in studies of the students of the day faculties increased by 10 percent, there were twofold more diplomas with distinction and a third as many students receiving threes, the nucleus of participants in scientific research increased by fourfold, 10-fold more works were given awards at various competitions and exhibitions.

Another impact is also of no small importance--the many years of joint work of the student and the instructor create favorable conditions for educational work and the formation of the civic, ideological, political and philosophical stands of the future engineers.

Great scientific forces are concentrated at any educational institution. Whether they will in the future choose the heights or will consider it possible, as they say, to clip coupons from the former achievements, which are becoming obsolete with each day, depends on the internal, moral and creative situation and collective demandingness. Today we have 460 instructors, 1,600 scientific associates and engineering and technical personnel, including 24 doctors and 330 candidates of sciences. The organization of the educational scientific production complex and the concentration of forces on the 8 most important scientific directions enabled the institute to participate productively in 13 comprehensive scientific and technical programs of the USSR State Committee for Science and Technology, the Academy of Sciences, the USSR State Planning Committee and many ministries.

The total amount of scientific research and experimental design jobs, which were performed at the educational scientific production complex in 1982 alone, came to 9 million rubles, they are all being introduced in production. The staff members and students during the year submitted 275 applications for inventions and received 4 patents abroad, 165 certificates for inventions and 13 medals of the Exhibition of National Economic Achievements. The economic impact from the introduction of developments during the 10th Five-Year Plan came to 92 million rubles, or about 3 rubles per ruble of expenditures.

We were also not mistaken that the educational scientific production complex would also have a beneficial effect on the training of our own scientific educational personnel of the highest skills--doctors and candidates of sciences and instructors, who are capable of rising from informational methods of instruction, when they confine themselves to conveying to students a large amount of systematized knowledge, to methodological principles of instruction, when they teach students the methods of the acquisition and gaining of knowledge, scientific research and the organization of the scientific and production activity of large collectives. The institute, after all, is provincial, and it is best of all for it to be concerned itself about the workday of tomorrow. Nearly all the heads of the basic chairs and the professors--they are quite young, somewhere around 40--are our own graduates, whom we "scrutinized" back when they were students.

I guess that the reader for a long time has been going to ask: Is everything really so truly well and serene? Of course not.

We have many of the very same problems and obstacles, which our colleagues from the Ivanovo Power Engineering Institute and the Krasnoyarsk higher educational institutions have, about which SOVETSKAYA ROSSIYA told in the materials "The Robot... Teaches Creativity" and "The Diploma Is No Yet a Crown" (6 May 1984). We also have to do much on "our own responsibility" and on enthusiasm alone. And there is no other way.

The standard curricula, which have been approved by the USSR Ministry of Higher and Secondary Specialized Education, today differ substantially from the vital need of the educational scientific production complex. For example, the scientific research work of students in general is not planned centrally, for the present we have to seek out unofficially time for this at the expense of other subjects. Apparently, the time has come to make the appropriate corrections. Otherwise the talk about the priority of the creative scientific work of students will just remain at the level of good wishes. Educational scientific production complexes already exist at many higher educational institutions, but the question of the legal and organizational basis of its activity so far has not been settled. While this, in turn, is aggravating the personnel problems and is checking the development of the material and technical base. Previously we very poorly expanded and equipped ourselves by means of above-plan accumulations with respect to science. However, in recent times on various pretexts the ministry has been withdrawing a significant portion of them from the budget of the higher educational institution.

The list of problems far from ends at this. But the educational scientific production complex has already proven its right to existence. It is necessary to polish the rest jointly.

Wage Experiment in Leningrad

Leningrad LENINGRADSKAYA PRAVDA in Russian 12 May 84 p 2

[Article by S. Pochin and Ya. Strugach: "What an Engineer Is to Be Like"]

[Text] The forms of management should meet present requirements," K. U. Chernenko stressed. "A number of the economic experiments now being conducted will undoubtedly help this." To check in practice new elements and principles of management, to determine the most effective ways of increasing the return and prestige of the key occupations for scientific and technical progress--such tasks were posed for the participants in the experiment on the improvement of the remuneration of the labor of designers and process engineers. It has been under way since July of last year at five large Leningrad associations.

The first results are available--our newspaper has already reported on them, the most complicated problems have been identified, the time for analysis, comparisons and thought is coming. This also prompted the editorial office to bring together at a round table representatives of the five collectives in order to find out their opinion on the changes taking place and to draw several conclusion. V. A. Grechanichenko, deputy general director of the Nevskiy zavod Association imeni V. I. Lenin; G. Ye. Antonov, chief of the Division of Means and Methods of the Automation of Designing of the Leningradskiy elektromekhanicheskiy zavod Association; A. N. Chernyak, chief process engineer of one of the works of the Izhorskiy zavod Association; USSR State Prize winner

V. N. Khokhulin, chief process engineer of the Leningradskiy metallicheskiy zavod Association; Ye. A. Marchenkov, deputy chief designer of the Division of Large Machines of the scientific research institute of the Elektrosila Association; and G. M. Khutoretskiy, chief designer of turbogenerators of the same association, took part in the discussion.

1. The Overcome Shortage

You cannot do without comparisons. Previously in these five collectives one frequently had occasion to hear laments about the shortage of designers and process engineers. But now they will say everywhere with satisfaction: not one design bureau, not one division and not one laboratory of those, which are participating in the experiment, are requesting additional forces. And what additional ones there are there! At the scientific research institute of Elektrosila, for example, in this time it has been possible to close an entire division and more than 20 sectors and laboratories.

And such is the overall picture: having improved the technical and economic indicators of their activity, the participants in the experiment decreased the number of engineers by 6 to 15 percent. This occurred first of all owing to the fact that the efficiency of engineering and technical personnel and the workload of each of them increased sharply.

Khokhulin: Today's situation, indeed, does not fit our customary ideas. I have been working for a quarter century as a technical supervisor. I always did not have enough people, while here the word "deficit" when settling personnel questions began even to be forgotten.

Marchenkov: The aspiration to use to the utmost the possibilities and data of the experiments is forcing all of us to reform not only the methods of work, but also the psychology and the approach to the matter.

Chernyak: Why "is forcing"? It has already forced. Here is just one example. In recent times in our division representatives of the office of service and the dining room have appeared quite often: they urge us to make orders and to purchase food selections. Previously lines were drawn up for these orders, during office hours, of course, but now no one is in a hurry--people are working! I can assert with full responsibility that each of the 680 process engineers of the Izhorskiy zavod Association, who are covered by the experiment, have begun to give more to production.

Correspondent: Each?

Chernyak: Each! In order to have opportunities for the stimulation of capable workers, to which we had received the right, it was necessary to release the maximum "superfluous" people, those who at work, in essence, sat behind the backs of others, who spent a large portion of the time in the

"smoking rooms" and lines for the same orders, whose functions others could divide among themselves. Moreover, we agreed to the reduction of the number of our subdivisions not by 10 percent, as was planned initially, but by 15 percent. Of course, a large load lay on the shoulders of the remaining ones.

Antonov: Did it not prove to be too heavy?

Chernyak: It did not, since we prepared carefully. The introduction of the individual planning of the work of process engineers became the main element here. Now in the subdivisions, in addition to the usual plan of the preparation of the production of a new item, there are without fail its monthly, 10-day and individual "breakdowns." Here not only the quantitative, but also the qualitative indicators--the decrease of the labor intensity and the production cost--are planned, the errors in the documents are taken into account. What is the result? Already on the 20th-29th of the month the process engineers come running to their supervisors: I will cope with my assignment ahead of time, I need work for another 2-3 days. No one wants to have nothing to do! Such an atmosphere made it possible, for example, for the first time in many years to bring the output of the prototypes of two new items with the 100-percent readiness of the machine tool accessories.

Grechanichenko: Apparently, in case of individual planning it is also necessary to take strictly into account the ratio of the increase of labor productivity and the increase of wages. How well are you succeeding in this?

Chernyak: Every process engineer at our place can in practice track this ratio daily, while trying to see to it that the increase of the former indicator would lead the increase of the latter. The norms, which were adopted at the beginning of the experiment, are also helping this. Now, incidentally, we are making them more rigid.

Khutoretskiy: I completely agree: we will not manage now in our work without norms.

2. Does the Norm Hinder?

It is a fundamental thing. The person of a creative occupation asserts: norms are not a hindrance to work! However, we will be frank: far from all of the designers and process engineers of the five enterprises express their opinion with such categoricalness. But the ice of the lack of confidence in the possibility to evaluate precisely the intensity of creative labor and to plan it clearly for the specialist, who is engaged primarily in the generation of ideas, all the same was broken by the experiment. The disputes with regard to what the norms for this category of workers should be and to what indicators is preference to be given, will not, obviously, subside for a long time yet. But one thing still is clear: this lever of the increase of the efficiency of specialists has already become a part of the life of design bureaus and divisions.

Khutoretskiy: Why precisely during the experiment did the norms "begin to work"? I believe that it is not at all because previously we did not understand their importance, while now we do. The establishment of various kinds of standards for designers began here at Elektrosila 10 years ago. But we did not obtain the expected impact from them, since the degree of fulfillment of the norms in practice was not linked in any way with the amount of remuneration of the labor of specialists. There were also other obstacles. For example, the question: Who should be the norm setter? remained unresolved. Now we have seen that the former obstacles were entirely surmountable. The managers of the design subdivisions have become the norm setters at our place.

Grechanichenko: And at our place.

Antonov: At our place as well.

Khutoretskiy: Of course, these duties required of highly skilled specialists specific efforts for "paper" work. About 10-15 percent of the time of the chiefs of sectors and groups is spent on calculations of this kind. In the future, I am convinced, it will be less, when everything is adjusted, when there is a bit less writing itself, for the indicators, which are now being calculated as an experiment, will disappear.

Antonov: But do you not fear that the "Procrustean bed" of the standard may hinder too much the especially talented specialist? At some moment he will not be able to "turn out" the specified number of standard hours, since he has not yet thought over his idea completely and has not yet embodied it in drawings. And what if in addition it is not clear whether this idea will yield a significant result? Is the specialist to be called a laggard or is he to be indulged with an advance?

Marchenkov: I believe that in this situation the norm simply proved to be imperfect and did not conform to the difficulty of the given assignment. Experience shows that any sufficiently skilled designer, but a talented one first of all, can cope with the established norms. If, of course, he does not dawdle and does not take refuge in the difficulty of the job. The whole point is in this: in the efficiency of the worker, in responsibility. And our norms, even though for the present they are not yet ideal in everything, like litmus paper make it possible to evaluate these qualities.

Chernyak: We at Izhorskiy are of the same opinion. Back at the beginning of the experiment we conducted here a mini-experiment. We gave assignments, which were approximately similar in amount and difficulty, to three groups of specialists. We gave this assignment to one "wholesale," having specified only the final deadline. We broke it down for the other two by weeks, into assignments for the individual staff members in conformity with the norms. Then we constantly kept a record of and monitored the progress of the fulfillment of these norms and reported the results to the staff members. As a result the first group, which operated according to the principle of "the free artist," upset the deadline. While the second and third accomplished the development ahead of schedule, having achieved in addition higher parameters

than anticipated. After this the question of whether or not to set norms for creative work did not arise at our place.

The first group is an example of how we previously worked: we assigned a job, but checked it only at the moment when it was already necessary to cry "help"--the deadline "is burning." Now with the use of norms we can both substantiate better the planned deadlines and efficiently keep track of the contribution of everyone. And each performer now knows himself: if he exceeds the 200 standard hours a month, which are set by the norm, he will receive a specific additional payment.

Correspondent: And are they exceeding them?

Chernyak: Not everyone, of course, but everyone is striving for this. It is possible to evaluate the impact of such a stimulus on the basis of the example, say, of two of our very strong process engineers--N. V. Timofeyev and L. M. Nilova. Previously they coped with a monthly assignment in the amount of 180 standard hours, now it is 225. The productivity has increased so drastically. And the evaluation of their labor also increased significantly--the average wage increased by 50-80 rubles.

Correspondent: Hence, at your place the time of the drawing up of documents as a whole should also decrease sharply?

Chernyak: Unfortunately, at times there is no direct dependence here. For, in addition to the designers and process engineers, economists, copiers and people of other occupations, who have nothing to do with the experiment, are participating in the work. They frequently reason approximately like this: "We do not need to hurry. We are not receiving a wage increment." It is clear that in such a situation the impact of the experiment decreases.

Grechanichenko: And still it is necessary to stress that the improvement of the planning, norm setting and stimulation of the labor of specialists even at the first stage of the experiment led to the shortening of the time of the development of new equipment and its introduction at the works. There are now already quite a number of examples of this, but we, of course, want there to be even more of them.

3. The Wage

The wage should be earned, that is, be confirmed by the labor and the results of it, which attest to the efficiency and the level of creativity of each engineer. The standards and the system of monitoring made it possible to evaluate with sufficient accuracy the quantity and quality of labor in the design and technological collectives and to discipline people. At the same time the experiment, while envisaging the increase of the wage of this category of workers, also bears in mind the fact that such an additional ruble will be a stimulus of the further improvement of the activity of engineers.

In what way does this ruble "work"? Under what conditions is its influence most effective? What changes did the increase of the wage bring with it?

Grechanichenko: The most important thing is the fact that all of us, the participants in the experiment, now feel equally certain with respect to the wage fund of the engineering subdivisions. Since it remains unchanged, we can without fear save a portion of the money for additional payments. On 1 January of this year we had decreased in the association the number of designers and process engineers by 5 percent and by 1 April by 7.5 percent and thus we have in reserve already more than 1,000 rubles. Therefore, the wage of designers has increased by 8.4 percent and of process engineers by 9.8 percent. As you see, we have, moreover, begun to rectify the injustice, which, in my opinion, existed a long time, when the salary of process engineers was less than that of designers.

Chernyak: In our division everyone now knows how much he will earn a month. Highly skilled engineers, who several years ago went to shops or other enterprises in large part due to the low wage, have returned to us. Say what you like, but the ruble is a powerful means.

Khutoretskiy: I believe that the essence of its influence is this: people have seen that they will be evaluated correctly. But the material stimulus, in my opinion, acts in two ways. In some instances, when it is a question of the performers, something like piecework arises: the more one did and the better he did it, the more he received. But in other instances we as if restore justice, granting an increment to those whom I would call creators, generators of original ideas and solutions. They also worked excellently before the experiment, without taking into consideration time and the expenditure of forces. One must not, as they say, wish for anything better. But now, when such a person receives an increment of 50-70 rubles, everyone sees that he already deserved it long ago. The ruble in this case acquires great moral meaning.

Marchenkov: I will add that the apprehensions regarding mistakes and a subjective approach in the evaluation of people--and many people expressed them--proved to be unfounded. In the collective everyone is seen quite well, and the manager of the group knows what one person or another is capable of and how he is working. In all 60 engineers work in our division. Of them 5 or 6 are now receiving an increment of 60 rubles and about 30 are receiving an increment on the average of 25 rubles.

Khokhulin: Do you pay for future or past work?

Marchenkov: For past work. We tally the results for the past month and set the increments. We establish for some specialists, in whom we are confident, increments for a period of 3 months.

Khokhulin: I am glad that everyone has begun to arrive at remuneration for past labor, and not to establish increments in advance. But all the same here, at Elektrosila, not the entire staff of engineers is participating in the experiment.

Marchenkov: How come? Everyone participates, but not everyone, just those who work without disruptions and mistakes, actually receive increments.

Chernyak: Yes, indeed, but on the average everyone does receive them. At one organization I saw even a chart of the receipt of increments and bonuses. They say that everything would be in equal shares during the year.

Khokhulin: This is already, you know, the profanation of the experiment, and in such cases it is necessary to pose the question of the adherence of the manager and the party organization to principles. In our division our own experiment on the stimulation of labor is also being conducted within the experiment. A combined coefficient of the quality of labor, which in turn is formed from three indicators--productivity, quality and discipline--has been developed for this purpose. We did not begin to concentrate all the forms of increments in the division, but gave them directly to the bureaus, which consist of 10-20 people.

Here we introduced the following conditions: first, the increment should be not less than 25 rubles; second, to pay them to only 70 percent of the collective and in conformity with the combined coefficient of the quality of labor, which was obtained from everyone during the month. Thus, a principle is in effect, as in production brigades in case of the distribution of the wage with allowance made for the coefficient of labor participation.

The point is that everyone would take part in the experiment, everyone would compete, while the people, who found themselves among the 30 percent who did not receive an increment, would understand that they are in the danger zone, not having met the increased demands.

4. "Do Not Do Much Harm With the Ruble"

Thus did one of the participants in the conversation, having applied the main precept of the physician to material stimulation, exclaim in the heat of the discussion. But, indeed, how much there is common here. A simplified approach to the monetary increment (as to a pill: he took it and got better) can lead to the opposite effect and cause such moral diseases as self-seeking, dissension in the collective and unscrupulousness.

Let us say at once that to our question "Were there during this time any conflicts on account of the ruble?" the representatives of all five enterprises responded negatively. But then a question of another kind arises: "Does the monetary increment always help to evaluate correctly and at their true worth the abilities of engineers?"

Grechanichenko: It seems to me that "the experiment in an experiment," which the comrades at the Leningradskiy metallicheskiy zavod Association are conducting, is interesting and edifying. A kind of selection of the most talented and industrious people is taking place by means of standards,

coefficients and monetary increments. And the engineers, who will often find themselves without increments, will also have to think, perhaps, about another place of work. But from the very start we did come to an understanding: to reduce the number.

Marchenkov: What is to be done in this case with young specialists? They are in a very unfavorable position.

Khokhulin: The remark is reasonable and not without grounds. When the Shchekino people began their experiment, the average age of the workers at their combine was 27. After 14 years it was 41. This is an extremely dangerous trend. Everything here depends on the manager--on how farsighted and principled he is. I am convinced that it is necessary to create preferential conditions for young engineers. In our division there is the following procedure: for the first 6 months a norm, which is 25 percent less, is given to the graduate of a higher educational institution, up to 1 year--15 percent less and in the following year--10 percent less.

Grechanichenko: I am convinced that such benefits and financial possibilities should be created for them in all collectives. It is best of all to settle such an important question centrally. It is impossible for the fate of young specialists and the intensity of their influx to depend on the consciousness of one manager or another. A system should operate here.

Chernyak: I agree. But since for the present there is no such system which is common for all, we have concluded contracts with several Leningrad higher educational institutions and have stipulated how many graduates and in what specialties will come to work in the next few years.

Marchenkov: That is, you are planning the process of the rejuvenation of the collective and are trying to influence it. But, in my opinion, in it there is one trend which is becoming most important: precisely young specialists willingly deal with systems of automated designing and computer technology. Therefore, we at Elektrosila are not simply interested in taking young people, this is advantageous to us.

Antonov: The advantage, pardon me, is theoretical: the wage fund, to all appearances, is not sufficient for all the enterprises which are participating in the experiment. For us this problem is especially urgent. The Leningradskiy elektromekhanicheskiy zavod Association and its designers are called upon precisely to set the tone in the development and use of computer technology and in the automation of engineering labor. Hence, the influx of new personnel is necessary especially for the development of software. But since the experiment has "frozen" the number of workers, in practice there is no influx.

Correspondent: But computer technology, of which there is more at your place than at other enterprises, is helping to get by with a smaller number of engineers.

Antonov: Undoubtedly. However, it is necessary to take into account the fact that both we and all other collectives, which deal with software, are faced

with the need to speed up the work. The time of the development of programs is still too great and requires large expenditures, while the results themselves quickly become obsolete. Therefore, a certain spurt is needed. The specialists of the association have now begun the development of an integrated general-purpose system, which is called upon to automate as much as possible the labor of engineers and to link it with production and versatile automated production systems. Individual units of this system are already being introduced, other enterprises can also use them. However, now a more rapid pace is necessary.

Khokhulin: It is also a matter of this. We have so far taken the first steps and are still proceeding by the extensive path. Standards, the increase of the responsibility of people, the selection of the most talented people, material stimulation--all this is necessary, the experiment has helped here. But there is also a certain danger: if we "lay" the ruble under every job, so that it would go more quickly, and count on its unlimited effect, we will inevitably find ourselves at a loss.

Correspondent: What is the solution? Where does the path to the intensification of engineering labor begin?

Khokhulin: This path begins with what our colleague from the Leningradskiy elektromekhanicheskiy zavod Association spoke about--with automation.

5. Free Minds for Creative Work

A paradoxical situation is becoming more and more perceptible at the enterprises which are participating in the experiment: there are many engineers, it is necessary and possible to decrease their number, but at the same time there are not enough of them. The point is that today's designers and process engineers have to accomplish much more complicated tasks than about 10 years ago. They are due not only to the increase of the complexity of engineering calculations themselves, but also to the extensive supply of production with NC equipment, robots and computer technology.

Here is a typical example: at the Leningradskiy metallicheskiy zavod Association they began about 8 years ago to develop programs for NC machine tools, by using computers. Now 20 programmers are engaged in this work. If they were to perform it "manually," without computers, not less than 100 people would be needed.

Antonov: In essence, in the level of the saturation and use of this equipment and systems of automated designing, so called SAPR's, the situation for everyone is approximately the same. There must be more and it must be better, but for the present it is not turning out.

Correspondent: What is the matter? Is there not enough equipment? Then imagine that today you can get everything necessary--what equipment would you take and in what amount?

Chernyak: A frightening question!

Khokhulin: In a flash I would respond: nothing. If today they immediately met all our orders and all our wishes, a significant portion of the equipment would be dead weight. We are not yet completely ready to use it. It is necessary first to perform a large amount of work on the development of software. Considerable efforts are already now being taken for this, but they are inadequate.

Khutoretskiy: We believe the same thing. At Elektrosila up to 95 percent of all the design calculation are now being made on computer. There are programs and algorithms and, what is the main thing, practically all the estimators also do not conceive of work without computers. Now the task is to draw up the sketches and all the necessary documents in the same way.

Marchenkov: Of course, all this is forcing us also to think about changes in the psychology of the engineer. Brigades for systems of automated designing, which convey to everyone the experience of those who have mastered this equipment, have been set up in our divisions. We immediately sit graduates of higher educational institutions down at computers. In order to use the plotter, it is necessary to wait until one's turn approaches, there are also few automated workplaces--ARM's.

Correspondent: But you, apparently, have submitted orders for the necessary equipment? How are they being filled? Are the colleagues from the Leningradskiy elektromekhanicheskiy zavod Association helping?

Marchenkov: The equipment has been ordered, but the orders, as is known, are being filled after many months. What we requested back before the start of the experiment, will be delivered in part only at the end of this year.

Antonov: Then another year will be required for its assimilation and the development of programs, the results will just appear, and precisely here the period of the experiment will conclude--it is intended for up to 1986. This, in my opinion, is a quite alarming situation. As to our assistance to the other participants in the experiment, for the present it is at the level of discussions and the exchange of opinions. There is still no close contact, while we do not have the means to supply automated workplaces. As they say, we have enough of our own sores.

Khutoretskiy: The approach to the broached problem, I believe, should be like this: one must not sit idle waiting for new equipment. It is necessary to prepare thoroughly for the work with it. Plotters, automated workplaces and systems of automated designing will yield the greatest impact only if we are able to change significantly the interrelations between designers and process engineers and their roles in the development of new equipment. The more computers there are used in this process, the more often the paths of designers and process engineers intersect. But the development of robotics and the production of versatile automated production systems bring us to the idea that not a designer and not a process engineer, but someone else--the

engineer of the future, who should be able to use the latest methods of the designing and production of machines and items--is needed.

The engineer of the future. Not only or not so much age determine the character of this person. It is being created today in many scientific research and planning and design organizations during the collective work on new machines and technological processes and in the search for more effective methods of production and economic activity. And it is possible to speed up the appearance of such a worker, the engineer of the new type, as the first results of the experiment, which began in July of last year at five Leningrad enterprises, attest.

All the changes, which were discussed at the round table of the editorial office, first of all are influencing the personality of the workers themselves. The standards and their connection with the increased wage are leading to the increase of the responsibility of the individual. The new demands and monitoring are forcing each person to evaluate strictly and on principle his own contribution to the common cause and to think about what it means to be an engineer. The need for the solution under these conditions of more and more difficult technical problems is indicating the main path--the freeing from routine work by means of computer technology and the transformation of the engineer into the most creative, "thinking" individual.

And here it must be stressed that such workers, the engineers of the future, today are being trained and should be trained not only in the collectives which are taking part in the experiment. In addition to fame and several benefits, risk and mistakes, failures and difficulties fall to trailblazers. But their experience of the successful solution of a number of problems belongs to everyone and should be used without delay and completely. The experience of the use of standards and planning, monitoring, the lessons of automation--it is important for many, many collectives to take all this into account and adopt it.

Of course, it is still too early to summarize completely the results of the experiment. Its participants, as was stated here, have quite a number of difficulties, unresolved questions and apprehensions. But the experiment is also for that--to test all possible versions and to find the best one.

Intensive Training

Moscow SOVETSKAYA ROSSIYA in Russian 6 Jun 84 p 2

[Article by Professor L. Naumov, head of the Chair of Pedagogy and the Optimization of Higher Medical Education of the Novosibirsk Medical Institute (Novosibirsk): "An Algorithm of Knowledge"]

[Text] Everyone, who has appeared on the pages of the newspaper under the heading "The Engineer of the 21st Century," agrees about one thing: it is necessary to increase the quality of vocational training at the higher educational institution. The problem is how to do this in the shortest time with acceptable expenditures and the minimum and least painful reorganization of the existing system of education. Various proposals have been expressed. The very best means of achieving success, in my opinion, is the intensification of instruction, since further extensive development with its uncontrollable expansion of the network of staffs and the diversion of personnel to nonproductive spheres of labor is a dead-end direction.

Not only student youth, but also many instructors, it appears, have forgotten about the economics of education. The idea that education in our country is free, prevails. However, it has been calculated that higher education, which by the early 1980's about 15 million people had received free of charge, has cost our society 560 billion rubles. This is nearly twofold more than a decade (1970-1980) of capital investments (300 billion rubles) in agriculture of the country!

But no one has yet calculated the material losses and moral harm from the "work" of certified, but unskilled people. No one has calculated the losses when highly educated people do not work at all in their specialty or hold positions which do not require a higher education. And it is a matter not only of the freezing of vast assets and spiritual values. Not only of the undermining of the state plans of the training of personnel. The disregard of this economy and the possibility not to be concerned about an effective return of education have noticeably confused in the consciousness of instructors and students the goals, tasks and "technology" of vocational education. The vocational school from the vocational and technical school to the higher educational institution continues to teach primarily knowledge, as if without noticing that not simply knowledge as such, but the practical ability and skills to work well are required of the specialist.

And whereas now, after the recently adopted "Basic Directions of the Reform of the General Educational and Vocational School," a decisive turn toward the teaching of practical activity has been planned at these educational institutions, the higher educational institution also needs it to no less an extent.

Experiments lasting many years. More than 20,000 written decisions done with one's own hand. Initially when solving occupational problems on the basis of traditional instruction they make many mistakes. But immediately after this the students and skilled specialists in several minutes solve the same or similar problems by means of teaching algorithms. And the number of mistakes

decreases by tens of times. Algorithmization is a universal method of the effective control of mental and physical activity regardless of the sphere of its practical application.

Programmed instruction, moreover, real programmed instruction, and not its "elements," forms in the best way many practical abilities and skills. Good algorithms and programmed instruction are capable of changing the strategy and tactics of vocational training and of drastically shortening its time. Finally, teaching simulation (business) games immerse the players into the conditions, which are close to the real conditions, of their future occupational activity, requiring and arousing completely different qualities of the mind than simply the memorization and reproduction of educational information.

The customary forms and periods of vocational training. The customary expenditures. But is it not time for the sake to the new goals and tasks, which have been set by the party, to reject categorically calm and habits?!

For example, for a long time vast assets have been spent on the training of typists. But the shortage of skilled typists is well known. But at the Laboratory of Automated Systems of Accelerated Training of the All-Union Scientific Research Institute of Vocational and Technical Education in Leningrad, which Candidate of Psychological Sciences A. M. Zimichev heads, by means of a set of effective methods of training on the basis of the influencing of nearly all the sense organs, the mobilization and intensification of the psychophysiological resources and abilities of a person they master rapid typing with all fingers, moreover, "by touch," in 5 days. The instruction in typing proper is carried out in short sessions, alternating with music, dancing, relaxing and tea drinking, and in all does not exceed several hours! What a saving of forces, assets and time! And it is a matter not only of typists! What about teletypes, displays?! What about the consoles of operators?! Moreover, the entire complex set of training equipment--projectors, films, tape recorders--is put into operation by one laboratory worker. But the main thing is, what a stimulus there is for the creative thinking of educators and specialists in educational methods of all ranks, who not only can, but also are directly obliged to use these methods in the vocational training of various specialists.

In general the new constructive ideas and methods of training people in any application of them yield a large practical return. For example, the low efficiency of any, even the best lecture at a higher educational institution is well known. At best the students, and then not all of them, will be able only to reproduce its content. But neither in the process of the lecture or immediately after it will the students be able to solve practical problems much better, since this is a qualitatively completely different, much higher level of instruction.

We had already long ago transformed our lectures radically, having saturated them with various, most effective methods of active instruction. As a result the quality of the solution of problems is improving by tens of times.

It is impossible to say that the workers of the higher school are not worried about how to increase the quality of the training of specialists. The point, apparently, is that at times they try to solve qualitatively new problems by the old extensive means, by increasing the study load of the students, but without changing anything in the content, principles, methods, means and techniques of instruction.

The Department of the Theory of Instruction Methods of the Scientific Research Institute of the Higher School is obviously not helping the instructors of higher educational institutions enough to increase the effectiveness of the vocational training of specialists. Now the optimization of higher education is frequently being developed only by the efforts of a few enthusiasts, but formal barriers also quickly dampen their enthusiasm. For example, not one of the specialized educational councils for pedagogy accepts for defense dissertations which are devoted to the methods of instruction in the higher school. Only the history and theory of pedagogy are "legalized." Therefore capable people prefer to spend forces and time on the development of traditional scientific directions, which promise the unhampered obtaining of an academic degree.

I managed to be a witness of and participant in a 2-week seminar for production leaders--designers, process engineers, inventors, efficiency experts, chiefs of shops and foremen of the largest enterprises of Novosibirsk. The seminar participants learned the theory and algorithm of the solution of inventor's problems (TRIZ and ARIZ). About 150 people mastered the methods, methodology and intellectual "machinations" of creative thinking in order to find a solution to the most difficult practical problems.

The mass instruction of the engineering corps in the theory and algorithm of the solution of inventor's problems will yield an economic impact in the hundreds of millions and billions of rubles and will drastically speed up scientific and technical progress in all its directions.

How are the new methods of instruction to be extensively introduced more rapidly, more inexpensively and more simply? For this, in my opinion, it is necessary to develop, to test experimentally and, after that, to publish in mass editions fundamentally new textbooks, educational aids, reference works and manuals. And our chair has experience in this. It is very difficult to write such textbooks. But it is nearly impossible to publish them: they are very unusual and far from the classical descriptive canons. But then their training impact is many times greater than the one which traditional aids yield. The new textbooks for students will also facilitate and speed up the adaptation of the instructors of higher educational institutions to new ideas.

Higher Technical Educational Institute

Moscow PRAVDA in Russian 15 Jun 84 p 3

[Article by Doctor of Technical Sciences Professor R. Mavlyutov, rector of the Aviation Institute imeni S. Ordzhonikidze (Ufa): "The Prestige of the Engineer"]

[Text] In recent years one has had to hear the popular opinion about the decline of the prestige of technical higher educational institutions and all but the devaluation of the occupation of engineer. Indeed, many institutes are now experiencing difficulties with admission to the first year. But it is a matter, it seems, not only of the prestige of the occupation, but of the backwardness of the ideas about its possibilities.

Traditionally the engineer was perceived as a creator of new equipment and technology with the incontestable authorship of his developments. He had specific conditions and techniques of labor, which were characteristic only of him. Now his duties have become extremely complicated, while the time of their accomplishment has been shortened. It is now necessary to coordinate precisely the labor of the engineer, which remains an especially individual pursuit, with the efforts of comrades and the collective. It has lost the former romanticism of a personal search due to the fact that it is somehow timidly absorbing the new possibilities, which are being afforded by computer technology, and is slowly parting with routine methods. As a result, for example, in the past half century the labor productivity in metalworking has increased by 10-fold, while the labor productivity of an engineer has increased by only 20 percent.

Thus, the problem of the thorough modernization of higher technical education and the more efficient use of the labor of the engineer at the works has become ripe. What is the essence of the present demands on the graduates of the higher school? The society of mature socialism needs the rapid introduction of the achievements of science, the rapid replacement of generations of machines, equipment, technology and methods of the organization and management of production, the processing of vast arrays of scientific and technical information and its creative use.

It is clear that under such conditions both the total number of meaningful, nonstandard and complicated assignments, which are to be accomplished in engineering practice, and the number of them, which are presented daily to each specialist, are rapidly increasing. One has to seek solutions more and more often at the meeting points and intersections of various fields of science.

What do we imagine our graduates to be like? They should become engineers of broad specialization, who have a solid training in the basic sciences, should master the "secrets" of specialization and should be able to take part in a dialogue with a computer. And without fail not lose their head in a nonstandard production situation and find its solution themselves.

It is well known that such an approach was successfully implemented by the Moscow Physical Technical, Engineering Physics and several other higher educational institutions of the country. However, the system of the Moscow Physical Technical Institute, being creatively individual, does not lend itself to circulation. Therefore each technical higher educational

institution has to seek its own "face" and to gain by the granted diplomas its own "stamp," which conforms to the orders for personnel. This matter is difficult.

Let us take, for example, the problem of making engineering education fundamental. The intensification of the training of students in mathematics, physics, chemistry, mechanics and other theoretical subjects requires the strengthening of the staff of instructors of the corresponding chairs, the introduction of problem instruction and the skillful combination of auditorium classes with the independent work of students. At our institute doctors of sciences and professors head all the chairs of the general theoretical cycle, the staff of instructors is made up, as a rule, of specialists with a basic university education. However, in the general engineering and special chairs the level of physics and mathematics training of the instructors for the present is inadequate.

The content of the courses of the general engineering and special subjects had to be revised. Descriptive, formula information frequently got in in them along with truly important information. Its reduction made it possible to make the courses more compact and convincing. But it has not been possible to complete the matter: the large number of subjects, when the educational material is unjustifiably divided, is in the way. For example, at machine building higher educational institutions the student in 5 years studies about 50 subjects. And the representatives of each of them, of course, consider "their own science" to be the most important. Here, of course, one is not to avoid duplication. The USSR Ministry of Higher and Secondary Specialized Education and the Scientific Research Institute of Problems of the Higher School should, of course, deal with the optimization of the structure and content of the curricula and syllabuses, without paying tribute here to obsolete ideas and traditions.

The basic training of an engineer involves today the reasonable mathematization of subjects, the thorough study of numerical methods and the acquisition of the skills of the construction and analysis of mathematical models in a dialogue with a computer. The traditional methods of manual calculations and the drawing of parts, assemblies and the entire design on paper by means of a drafting unit can no longer satisfy here. There are neither enough forces nor enough time for the unhurried looking over "by hand" of versions and the analysis of mistakes. Automated workplaces, which include computers, displays and plotters, are necessary attributes for the successful work of the modern designer, process engineer and production leader.

However, even leading and strong higher educational institutions for the present are faced here with significant difficulties. They have to determine themselves the optimum possibilities of the mathematization and cybernetization of the educational process, to carry out the further training of instructors and attendants and to set up quite powerful computer centers with developed peripheral devices. However, universities and institutes do not have either adequate funds or budgetary assets for the acquisition of modern systems of automated designing and the automation of scientific research. As a result not only the educational process, but also research suffer. A third of the scientists of the country and nearly half of the

doctors and candidates of sciences, as is known, are concentrated at the higher school. Meanwhile, the output, which is brought "to the surface" by the scientists of higher educational institutes, according to the estimates of experts, does not exceed 15 percent of the all-union results. Researchers are "spinning wheels" in economic contractual minor themes: there are approximately 100,000 orders for 500,000 instructors.

But it is difficult to organize major comprehensive research and experimental design work. We, for example, had to draw up ourselves a detailed and meticulous "table of contents" of the sectorial technical "concerns" and to evaluate soberly the reserve, which was available at the higher educational institution and in other scientific pedagogical collectives and on which we could rely. Thus the program on sectorial technology with the participation of about 40 higher educational institutions of the RSFSR arose. Its merit lies in flexibility, when not the individual scientific institution, but the order of industry is financed and provided with resources.

And it has already been possible to achieve much. For example, methods of the shaping of metal with the use of the effect of superductility, which ensure the increase of its utilization ratio by two- to threefold with the simultaneous improvement of the strength characteristics of items, have been found. This is the merit of our design and technological bureau under the supervision of Professor O. Kaybyshev.

Our experience has demonstrated: precisely in the interchair and interfaculty subdivisions within the higher educational institutions--the special design bureau and sectorial and problem laboratories--it is more convenient to produce on a real scale and to turn over to the client machines, instruments and machine tool accessories, thereby speeding up the introduction of the results of research and development. Now our special design bureau, 2 problem laboratories and 11 sectorial laboratories account for two-thirds of the total amount of scientific and technical orders. And the share of each theme has become on the average twofold greater than for other higher educational institutions.

And still, not matter how important the "output" indicators of science of the higher educational institution are, its main goal is to serve the training of future specialists. The themes of course and graduation designing, as a rule, are connected with the research work of the chairs. Our practice and the experience of other higher educational institutions, such as, in particular, the Moscow Machine Tool Building and Aviation Technological institutes and the Kuybyshev Aviation Institute, convince us that the present student does not want to remain a schoolboy and willingly sets to work on the fulfillment of real assignments, in which it is possible to check his engineering aptitude, imagination and independence of judgments. And the contribution of our pupils to the fulfillment of the conceptions of their older colleagues is very significant: they frequently propose original, even bold solutions.

It is believed that the weakness of the experimental and especially the pilot production base was and remains the Achilles' heel of science of the higher educational institution: they blame precisely it in case of failures in the introduction of the results of research. But it is possible not under the

auspices of every chair and not at any higher educational institution to set up laboratories and "microshops," providing them with modern equipment, computer technology and machine tools. It is more advisable to introduce cooperation between higher educational institutions. This idea has found supporters in a number of regions, including Bashkiria, where on the basis of our institute a large educational scientific and pilot production complex is being developed and the collective use of computers, unique instruments and equipment is being set up. The initiative has received support on the part of the Bashkir Oblast Committee of the CPSU and the RSFSR Ministry of Higher and Secondary Specialized Education.

And still this effective and efficient experience, which abolishes the archaisms of the natural economy in the system of higher education, is being spread slowly and timidly. The departmental isolation of the institutes, which are financed and supplied by different ministries, is in the way. But the union Ministry of Higher and Secondary Specialized Education and State Planning Committee are in no hurry to express an authoritative opinion: How are the departmental barriers to be overcome?

So far scientifically sound criteria and standards, which make it possible to evaluate objectively the actual needs of sectors for engineering personnel, have not been formulated. The orders, which are drawn up "at a guess," and the illusions about the "gratuitous nature" of young specialists, which are prevalent among personnel workers, are giving rise to carelessness and irresponsibility with respect to the efficient use of our graduates. The executives of some ministries monitor much better and are more concerned about the use of machinery and equipment than about the wise application of the labor of engineers. It is necessary to establish state order in this matter. It is at last time for the union State Planning Committee, State Committee for Science and Technology and Ministry of Higher and Secondary Specialized Education to increase the precision of the order for personnel to technical higher educational institutions. The instructions of the April (1984) CPSU Central Committee Plenum call for this. And then the engineering corps of the country will be able to participate more effectively in the changeover of the economy to the path of intensive development.

University Training

Moscow PRAVDA in Russian 10 Jul 84 p 3

[Article by I. Tarapov, rector of Kharkov University: "The Mission of the University"]

[Text] Once a colleague from an engineering higher educational institution noted: "It is simpler for universities to live. Both the title speaks for itself and the diploma has prestige. That we would have your worries...."

Yes, technical higher educational institutions today have to solve difficult problems--both on the enrollment of students and on the increase of the level of their training. The article of R. Mavlyutov "The Prestige of the Engineer" (PRAVDA, 15 June) is evidence of this. And still our worries are similar.

Moreover, if they do not begin to worry in time, in the next few years universities will be faced with the same difficulties as polytechnical and sectorial institutes.

First of all it is easy to foresee an increase of competition on the part of pedagogical higher educational institutions. During the reform their material base will be strengthened, while the period of instruction will be increased to 5 years. And it should be expected that universities will be out many matriculants.

On the other hand, we are experiencing the "pressure" of industrial enterprises, which more and more often are submitting orders for our graduates, although the latter far from always have the necessary specialization. However, basic training in the natural sciences enables them to accomplish more rapidly the tasks of developing the latest equipment and technology and to adapt to changes of production situations. It would seem that one has only to be glad--a university diploma is of greater and greater value. But here is what is alarming: large technical higher educational institutions with the support of sectors have begun to surpass us in the material supply of scientific research. It is clear that the most skilled scientists and instructors have begun to be drawn immediately there. And if the situation does not change, serious harm will be done to university education.

Our young "colleagues," who have been converted from pedagogical higher educational institutions, have also unwittingly contributed to the decline of the prestige of a university diploma. Some of them, having changed only the signboard and without having the necessary methods and material base, are not capable of taking part either in the solution of national economic problems which are in any way serious or in the conducting of basic theoretical research.

And already more than once one has had occasion to hear the cautious question: But are universities in their present capacity needed? Or is it better to turn some of them "back" into pedagogical higher educational institutions and others into technological institutes? I am convinced that in the interests of higher education it is time to strengthen practically the role of universities as leading scientific, pedagogical and cultural centers.

One should begin with the proper organization of the system of scientific research, striving for the optimum combination of basic and applied work. In recent years at universities applied researchers have prevailed: economic contracts account for up to 70-80 percent of the total amount of research. Perhaps, there would be great misfortune in this, if it diverted capable theorists from their immediate job. I do not want to belittle their efforts: frequently technical and technological paradoxes imply fundamentally new means of creative research. But minor themes--and enterprises "toss" precisely them to us--more often give rise only to routine decisions and the repetition of material which was already covered long ago.

This, in turn, also does harm to the matter of training specialists. It is no secret that university science always served the early maturation of the

thinking of students. Many of them are capable already in the third and fourth years of approaching original assignments, which do not have analogues and require of the beginning scientist not so much erudition as a general-purpose range of knowledge in all the wealth of its possible combinations. But if a tutor is tempted by pragmatism, his pupils unwittingly follow him. And for a long time they are mired down at wayside stations of secondary research, which do not give room for imagination.

That is why at our university we are striving first of all to strengthen the major scientific schools. In the past year alone 13 doctoral dissertations and more than 40 candidate dissertations were defended. While economic contracts are concluded only if they conform to the basic theoretical developments of one chair or another.

The procedure of establishing the category of higher educational institutions has become a serious obstacle to the increase of the prestige of a university education. Today their "rank" is determined by the number of students. And the qualitative composition of the scientists and instructors is entirely disregarded. But higher educational institutions are famous not only for the number of graduates, but also for their scientific pedagogical collectives!

This question has been discussed for more than a year. But every time the matter comes up against the fact that the training of highly skilled personnel at institutes is cut off by purely administrative considerations from academic science. The not always wise restrictions on the combination of jobs and the different department affiliation of the balances hinder cooperation. The result is: universities do not have enough assets to check and implement the ideas of their scientists, while science is out hundreds of gifted researchers, who were never able to reveal their capabilities in the crowded conditions of the laboratories of higher educational institutions. The deciding word here belongs not only to the union Ministry of Higher and Secondary Specialized Education, but also to other union departments.

Another no less honorable role is also in store for universities in our country--to serve as centers of education. I should admit: in recent years our contact with the secondary school has weakened. The number of specialized courses has decreased, the interest of students in the thorough study of physics, chemistry and biology has begun to fade. During the entrance examinations colleagues usually lament the "omissions" of teachers. But we are obliged to give them help! Especially as among them there are many of our graduates: at the schools of Kharkov alone--a third of the teachers, while among directors and directors of studies--about 60 percent.

"Direct" contacts with school children come, of course, with difficulty. It is necessary to organize circles, lecture bureaus, youth correspondence schools and appearances of scientists and to take part in the preparation of textbooks and aids. Now we are striving to organize these relations in a new way and to conclude long-term creative contracts with the departments of public education.

A new trend is also growing stronger before our eyes. During the school reform a significant increase of the number of school graduates, who enroll in

the higher educational institution from secondary vocational and technical schools, is expected. However, their level of training in general educational subjects for the present leaves much to be desired. Some graduates of secondary vocational and technical schools, having enrolled here, during the first year do not meet even the "easy" requirements on physics, mathematics, Russian and chemistry. I believe that all higher educational institutions have to increase their responsibility for the organization and level of the educational process in the system of vocational and technical education.

For 7 years now our university has been performing systematic work at the vocational and technical schools of the city on the increase of the level of teaching of physics, chemistry, foreign languages, social science and other subjects. We systematically conduct methods lessons with instructors, professors acquaint them with the topical problems of modern science. Having organized an educational psychology lecture bureau, the teaching practice of students is conducted at secondary vocational and technical schools.

The conclusion from the experience acquired by us of contact with both schools and secondary vocational and technical schools is clear: we do not have the right to wait until their graduates begin to meet the increased requirements of a higher, and especially a university education. A wait-and-see attitude merely will have the result that we will begin to lose the school graduates, who are most capable of studies, for they are now also valuable at the works. Consequently, it is time for higher educational institutions to unite, and not only for the formation and extension of the system of vocational guidance, but in order to help upper grade students to acquire knowledge and to apply it skillfully in practice. Who, if not the universities with their rich pedagogical and methods tradition, is to head this work, to find among teachers and instructors like-minded people and to treat their pedagogical experience creatively?

Important changes in the education and training of the rising generation are approaching both in school classrooms and in undergraduate auditoriums. They, the young people, have to enter life, using their knowledge skillfully and being prepared for labor and service to the chosen occupation. And the universities should already today satisfy the requirements of this lofty mission.

Image of Engineer

Moscow SOVETSKAYA ROSSIYA in Russian 5 Aug 84 p 2

[Interview with Corresponding Member of the USSR Academy of Sciences Viktor Petrovich Belyakov, Hero of Socialist Labor and general director of the Balashikha Scientific Production Association of Cryogenic Machine Building, by M. Kushtapin: "Toward a Formula of Creativity"; date and place not specified]

[Text] Our interlocutor is Corresponding Member of the USSR Academy of Sciences V. P. Belyakov, Hero of Socialist Labor and general director of the Balashikha Scientific Production Association of Cryogenic Machine Building.

[Question] Viktor Petrovich, I see on your desk the issues of SOVETSKAYA ROSSIYA with publications of the heading "The Engineer of the 21st Century." Did you read them specially for our meeting?

[Answer] I read them without yet knowing about it. I am an old subscriber of your newspaper and as a person, who deals directly with technology and engineering labor, could not but direct attention to the heading. The newspaper has submitted an extremely important problem for discussion. The engineer is one of the main figures, who govern scientific and technical progress. Precisely he develops the latest equipment and technology and introduces in practice scientific discoveries which yesterday seemed fantastic. With what scientific and technical, production economic and, in the end, social level of development we will step into the next century, in many ways depends on his talent, knowledge and skills. However, what I am explaining to you is banal truths.

[Question] They are not so banal, if you consider that the following opinion is now also very widespread: an engineer is an "unprestigious" occupation, the possessor of which without particular prospects wears out pants at a routine job or the solving of crossword puzzles and is of greater benefit to the affiliated kolkhoz, when harvesting potatoes or beets, than to his own enterprise.

[Answer] Well this, I beg your pardon, is the portrait of an engineer from page 16 of LITERATURNAYA GAZETA. We will find ordinary sorry specialists, who yawn from boredom, not only among engineers. There are enough of them, alas, in any occupation. But they are not the ones who count.

As to the "unprestigiousness" of the occupation, in my opinion, this is a strange word combination from the same narrow-minded rank as a "prestigious" item. A person achieves respect, honor and fame not owing to affiliation with some occupational or social group, but only by means of his own abilities, knowledge, skills, individuality and significant results of labor. Is it really of greater prestige to be, let us assume, a mediocre actor than a fine lathe operator, grain grower, engineer?

There is nothing strange and unnatural in the fact that the concept "engineer" in public opinion is undergoing a certain "price reduction." The occupation, it can be said, has already become a mass one. In the number of certified technical specialists we by right hold first place in the world. This is commendable and natural. Another thing is bad--the trends toward the unassiduous, unpractical use of the specialist with an engineering diploma are appearing more and more distinctly. What do you know, they say, an engineer, some organizer of production reasons, they are in abundance at any enterprise, but then a skilled lathe operator, a fitter--go and find one. Here we are faced no longer with the social devaluation of the concept, but with the occupational devaluation. Of course, this symptom cannot but cause alarm: it is nearly always possible to encounter an engineer, who has been forced to work at a job, which is not characteristic of him or requires lower skills. Is it worth saying that such a practice is disastrous for the specialist, it is also disadvantageous for the state, which has spent considerable money on his training. The now existing system of the remuneration of his labor also

does not properly stimulate the creative efficiency of the engineer. It does not take into account the personal qualities and results. The engineer receives a wage in accordance with a wage scale. The increase of the salary of the most capable and productive specialists is possible only by their advancement in position. But this means that I should appoint a talented engineer the chief of a sector or division and place under his subordination not less than 10-12 specialists, that is, transfer him from the "technical" to the "administrative" level. As a result industry, as a rule, loses a competent technical specialist, but does not always acquire in exchange a competent administrator. These and several other problems are the costs not of the occupation, but of production, the management and economic mechanism and the system of moral and material stimulation.

[Question] But, I hope, you will not dispute the fact that in public opinion a "hierarchical" ladder of occupations all the same exists. The authors of our newspaper have established that the number of those desiring to acquire engineering specialties is steadily decreasing, the competitions for technical higher educational institutions are declining.

[Answer] What is there to dispute here? The popularity of some occupations or others among young people and, consequently, the competitions for higher educational institutions most frequently are explained only by the tribute to fashion. And fashion is a capricious, frivolous mistress, it is also silly to argue with it. Therefore, I do not see great trouble in the fact that there are fewer people who wish to enroll in technical higher educational institutions than, for example, in theatrical higher educational institutions. It is important, after all, not how many school graduates sought a single student place, but who became the student, why he chose this higher educational institution and this specialty and to what extent he thought over his step.

But here the question of vocational guidance also faces in its full magnitude the family, the school, the higher educational institution, the entire national economy and, of course, the young person himself. The fashion of an occupation, which is divorced from the real needs of society, the enormous competitions for some educational institutions and the shortfalls for others, dissatisfaction and disillusionment in the acquired specialty, the same pseudoprestige--all these are the results of serious shortcomings of vocational guidance work. It should be performed not spontaneously, not haphazardly, not on the enthusiasm of individual educators, but, as is envisaged in the Basic Directions of the School Reform, on a scientific, statewide basis. In my opinion, the conversation about the training of specialists of the 21st century should also begin with the serious vocational guidance of school children on the scale of the entire state. Many problems of the higher school will disappear by themselves, if there are no casual seekers of diplomas in the undergraduate auditoriums.

[Question] What kind of problems will remain?

[Answer] Perpetual ones. How is one to teach, what and for what? I have noticed the dissatisfaction and anxiety of the authors of the heading (and for the most part workers of higher educational institutions were them) with the

present level of the training of engineering and technical specialists. This is a good omen. Instructors from the standpoint of today and tomorrow are critically reevaluating the experience of the higher school, its forces, possibilities, the traditional forms and methods of instruction in order to fulfill more effectively and completely their social order.

The vigorous leap forward in the development of science and technology revealed a gap between education and production. Industry today is retooling and modernizing more rapidly, in other words, is trying not to lag behind scientific and technical progress. But the higher school to a significant extent is operating according to the very same syllabuses and textbooks as 5 and 10 years ago. But what are 5 and 10 years in our times? These are entire ages of entirely new scientific and technical sectors. Not that long ago I was a witness to how a respected professor gave students a lecture on cryogenic technology and illustrated it with 10-year-old slides. I was ashamed of him and at the same time sorry for the boys and girls, to whom they presented the day before yesterday as our achievements. The mighty onslaught of electronics, computer technology, automated systems of control and programming and manipulators and the unprecedented and ever increasing flow of information had taken the engineer by surprise. He got lost and felt intimidated before the new technology, since he was not prepared not only practically, but also theoretically to meet and work with it. Here we have come to the main thing: modern production requires an engineer of a new type. The traditional system of the training of a specialist with a higher technical education needs radical and rapid reorganization.

[Question] With what, in your opinion, should this reorganization begin?

[Answer] Judging from the materials of the heading "The Engineer of the 21st Century," it has already begun. The workers of the higher school not only understand what kind of specialist practice expects from them, but are also actively seeking new forms and methods of instruction and are trying, even though frequently at their own risk, without having adequate assets and a base, still to bring the educational and training process closer to the vital needs of industry and science. Note: in every article there is a sensible, concrete discussion, not theoretical arguments and abstract fantasies, but a practicable program and their own experience. The authors advocate a basic theoretical training, a new amount of knowledge and the inculcation in students of a general methodological approach to the development of new processes and machines and the cultivation among future engineers of a sense of the need for constant self-improvement and self-education. A modern specialist is inconceivable without these qualities. True, I would still make it his duty to know foreign languages. For the present, unfortunately, at technical higher educational institutions they teach them formally. But without a good knowledge of a foreign language, and not one, but two or three, an engineer simply is not to follow the fresh scientific and technical information, which is most necessary for work.

It is important and necessary already at the student desk to give the future engineer an opportunity to become familiar with computers and automated systems of control and designing. For the engineer of the near future a personal microcomputer will be the same kind of everyday tool as the slide

rule is now. But I would like to caution against extremes: also not to renounce the old good methods of instruction, when develop the mind, thinking and imagination, train the memory and inculcate industry and diligence, the ability to do something with one's own hands. No machine will be able to replace man's head and hands. The effectiveness of instruction depends not so much on the amount of knowledge acquired by the student (here any computer is out of the competition), as on the ability to apply it in practice and creative work.

The direct contact of the higher school with science and production ripened long ago. It should be greeted and encouraged in every way. Students should receive the lion's share of knowledge not from textbooks, which now are already becoming obsolete at the printing house, but from the mouth of scientists and experienced workers. In this connection, it seems to me, it is necessary to obligate instructors to update their series of lectures every year, so that the latest word of science and technology would find reflection in them without fail.

We will hope that the experience, which has come to light at several higher educational institutions of Moscow, Ivanovo, Tomsk and other cities, will be generalized as quickly as possible and will be brought to a common denominator and to introduction in the practice of every higher educational institution. Not as an experiment, but as a vital necessity. As an officially approved program of the higher technical school, which has been elaborated in a scientific methods manner and is supported materially and technically.

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